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SEEDTIME AND HARVEST TODAY

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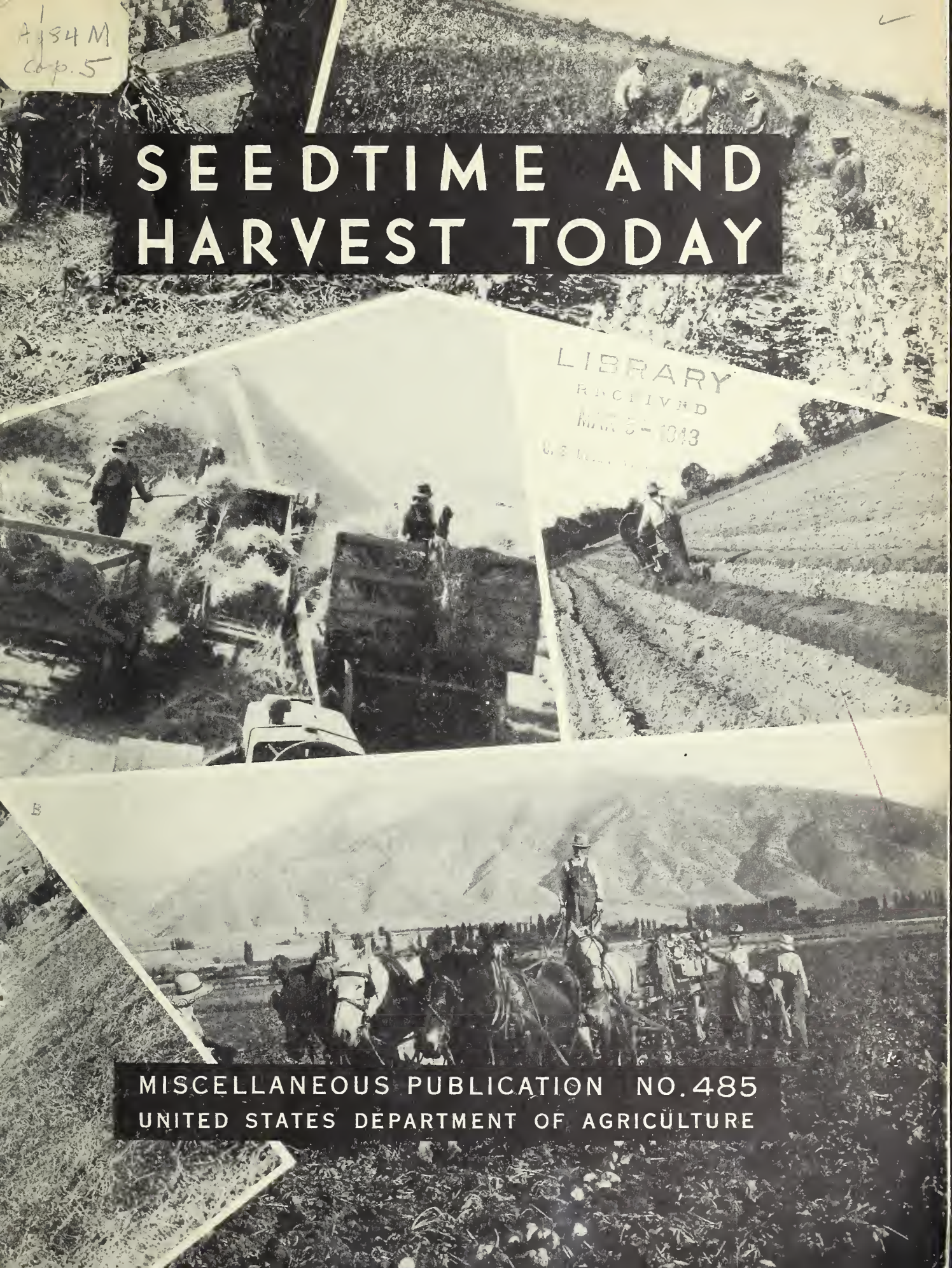

MISCELLANEOUS PUBLICATION NO. 485
UNITED STATES DEPARTMENT OF AGRICULTURE

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UNITED STATES DEPARTMENT OF AGRICULTURE

Miscellaneous Publication No. 485, Issued August 1942

SEEDTIME AND HARVEST TODAY

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UNITED STATES GOVERNMENT PRINTING OFFICE, WASHINGTON, 1942

For sale by the Superintendent of Documents, Washington, D. C., Price 25 cents

SOURCE OF DATA

In general, this publication is based largely on Department Cir. 183, Seedtime and Harvest, issued in 1922 and 1917 Yearbook Separate 758.

A description of the technique used in making most of the maps is found on pages 537–40 of that Yearbook. They were compiled primarily from thousands of reports received from the township crop reporters of the United States Department of Agriculture. They average for the major crops perhaps 10 to a county.

The maps here published have been submitted to the various State Agricultural Experiment Stations and Extension Services for suggestions. In many cases the original maps were considered satisfactory, in others slight revisions have been made. A series of new maps is included that show planting and harvesting dates for vegetables. They were prepared on the basis of reports received from State horticulturists, truck farmers, and other well-informed persons. The graphs regarding labor were prepared largely from data published in bulletins of State experiment stations. Other maps and graphs have been compiled from data gathered during the course of years by the Bureau of Agricultural Economics.

Maps relating to harvesting methods for grain crops and the extent of the use of machine power, animal power, and hand methods for performing specified crop operations apply to crops harvested in 1938 or 1939. They are based on questionnaire information from crop reporters. In February 1939 these reporters supplied information relative to the acreage of wheat and oats harvested by different methods and the percentage of the 1938 acreage of corn for grain that was harvested with mechanical field pickers. Then, in February 1940, information was obtained as to the percentage of the work involved in specified operations in producing major crops that was done with tractor-drawn machines or implements, animal-drawn machines or implements; and as to the amount of work done by hand methods. Information was applicable to the immediate localities of the reporters. During each year more than 25,000 usable reports were obtained.

Results of the study regarding harvest methods and harvest rates for corn, wheat, and oats in 1938 were summarized in Agricultural Statistics 1940. Findings of the 1940 study were summarized in a mimeographed report, Machine and Hand Methods in Crop Production, and in Agricultural Statistics 1941.

ACKNOWLEDGMENT

The assistance of Josiah C. Folsom, associate agricultural economist, and Raymond S. Washburn, assistant agricultural economist, Bureau of Agricultural Economics, is acknowledged by the authors.

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SEEDTIME AND HARVEST TODAY

Importance of These Seasons

Seedtime and harvest have always been the peak seasons for farm labor, whether done by men and horses or by men and machines; and the approximate dates of these activities are of vital concern to many. But now, with war pressing hard upon our whole economic life, they become of even more critical immediate import. The plans of farmers, farm laborers, employment agencies, transportation systems, markets, and commercial concerns that buy and sell in farm areas are often drawn with the harvest seasons particularly in mind. Now, more than ever before, we need to take account of such circumstances if we are to attain that full production which is our goal.

A marked present departure from past conditions during these seasons has to do with farm laborers and their families. Here, again, war, with its drain on manpower for all purposes, adds emphasis to a peacetime trend. Several circumstances, even before this country entered the war, had reduced the need for laborers in farm planting and harvesting work in which vast numbers were formerly employed. This publication takes special note of these changed conditions.

Long Decline in Farm Employment

Employment in agriculture has apparently been slowly declining for the last 30 years. The total employment in 1909 was 12,209,000 persons, whereas in 1940 only about 10,450,000 were employed. A great part of this decline of almost 15 percent took place between 1916 and 1919—the period of the World War, when men were in demand by all important industries. There has been a decline of more than a million agricultural workers since 1916, and the end of the decline is not yet in sight.

In a factory the employees, protected from the weather, can work every working day of the year, provided the production is regulated so that steady employment is maintained, although it is true that many industries are still seasonal and others regulate production closely in relation to the demand and price conditions.

Labor in agriculture is not only limited by weather conditions but also must conform to the seasons. It is necessary to handle each crop operation—planting, cultivating, harvesting, for instance—at a particular time of the year. The character of the work is constantly changing because of development of new varieties and new equipment so that varying amounts of labor are needed to perform seasonal operations on the various crops.

Substitution of Mechanical Power

In the South, preparing land, planting, chopping, hoeing, and the picking of cotton require the greatest amount of labor; this is especially true because cotton must be picked soon after the bolls open if discoloration and waste are to be prevented. Mechanical pickers long invented but still being improved, may eventually replace many laborers.

In the wheat regions, harvest brings the greatest need for farm laborers, for if wheat is not harvested promptly it will shatter or be damaged by weather. But the use of the combined harvester-thresher has so decreased the demand for harvest hands that in most large wheat-growing States only a few outside laborers are now needed compared with the many thousands needed 20 years ago.

Employment in agriculture in the last three decades probably has been affected most by the increased use of farm tractors and complementary machines. In 1910 there were but few gasoline tractors and thus they had little influence on the number of agricultural workers required for crop production, but since then the technical developments in farm machinery have been steady and significant. Farm tractors today

are greatly improved in design, lighter in weight, adapted to more operations and operate at lower cost.

Man-hours have been reduced and horse- or mule-hours have been greatly reduced or even replaced in many cases by general-purpose tractors in the work of preparing the land and of planting, cultivating, and harvesting the crops, making seedtime and harvest a very different story today. In the wheat-producing areas of the Great Plains and of the northwestern States tractors now provide most of the farm power. In the cotton, dairy, and potato areas, however, horses and mules are still the principal source of power, but their part is gradually diminishing.

Improved farm practice, larger power units and equipment generally tended to reduce the number of laborers needed. Output per farm worker has increased about 20 percent since 1910. In view of all these facts and tendencies there is little likelihood that the volume of employment in commercial agriculture will increase in the near future under normal conditions. During periods of economic depression however, and lessened work in the cities and towns, many former members of farm families will doubtless return to the farms, temporarily at least.

Family and Migratory Labor

In many farm families the women and children must help with farm work, particularly during rush seasons of planting, cultivating, and picking or harvesting. They may be members of the family or they may be hired (fig. 1). Women and children

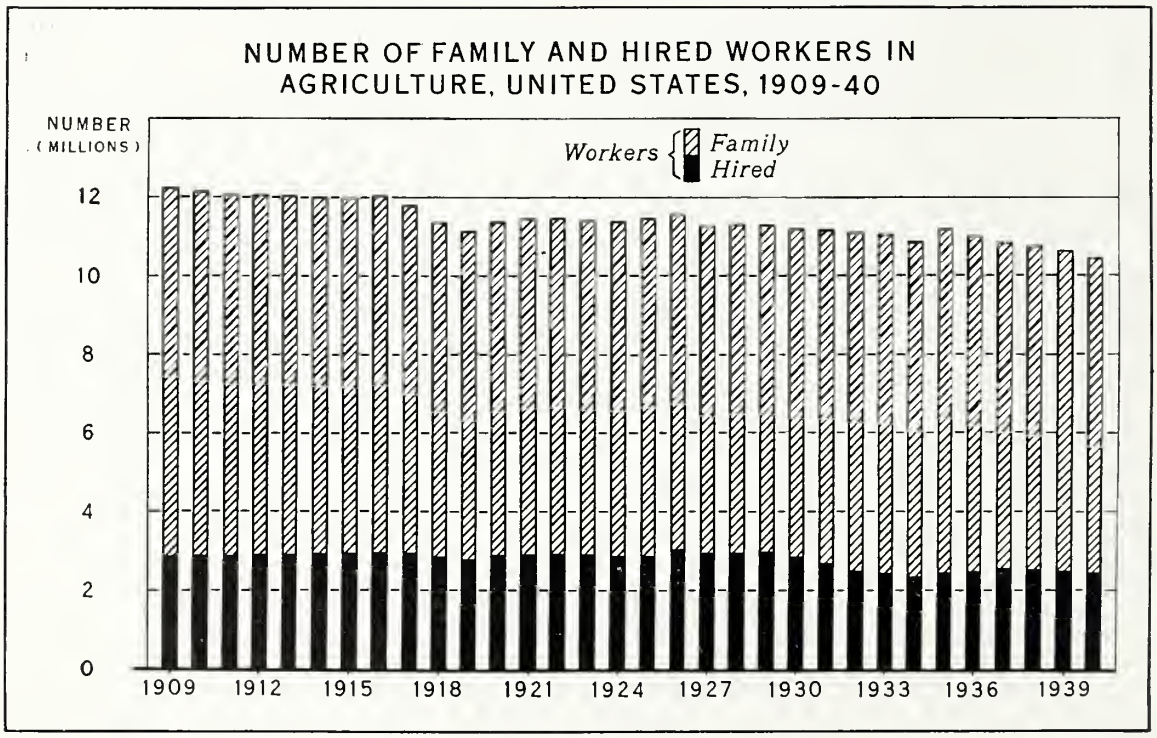

Figure 1.—Farm operators and members of their families who work without wages amounted to about 75 percent of the total number of persons engaged in agriculture in 1940. From 1909 to 1940 inclusive farm family workers declined more than 1,300,000 and hired workers declined about 400,000. Hired workers declined 18 percent between 1929 and 1933 and increased slightly from 1934 to 1937 and again declined. Both the family workers and hired workers reached a new low in 1940. (Estimates are based on returns from reporters of the Bureau of Agricultural Economics, United States Department of Agriculture).

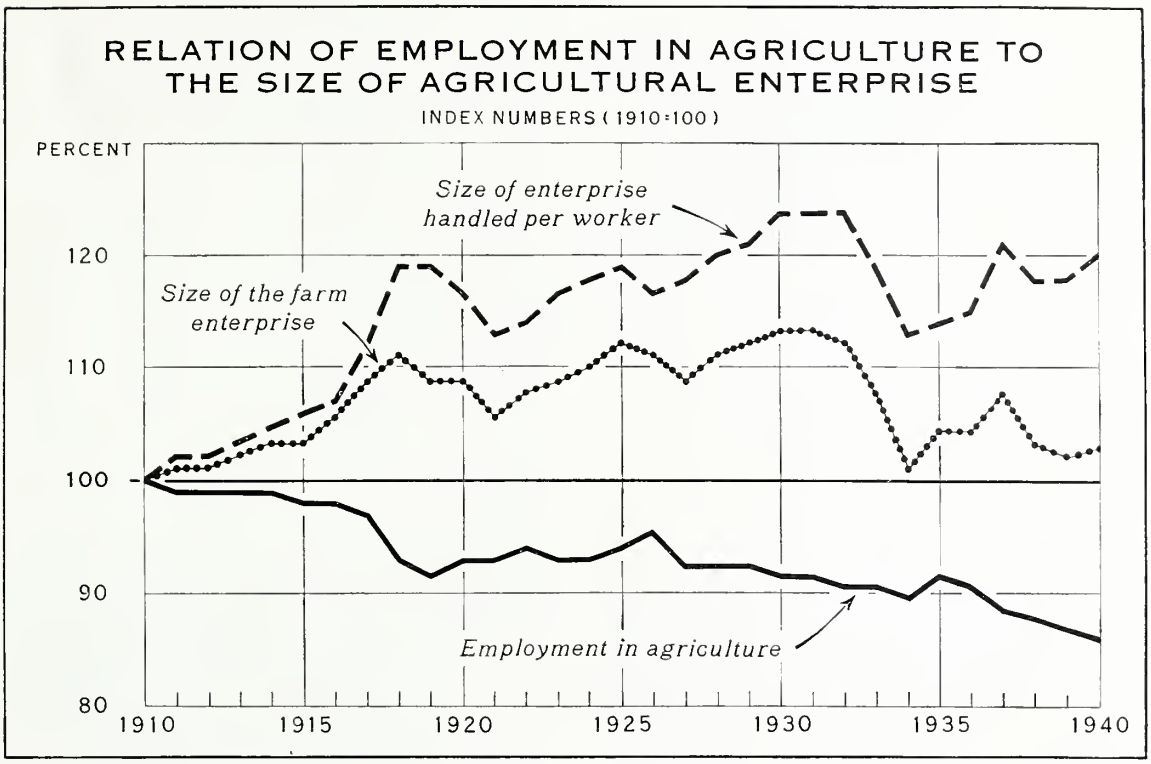

FIGURE 2.—The size of farm enterprise, measured in terms of crop acreage and number of livestock, combined on basis of labor required per unit, showed an increase of about 12 percent from 1910 to 1932. In 1934 it declined to about the 1910 level. From 1934 to 1937 it increased 8 percent, but by 1939 it was down again to nearly the 1910 level. The size of enterprise handled per worker is now about 20 percent greater than in 1910, and this has contributed greatly to the 14-percent decline in total number of workers employed in agriculture for the corresponding period. (Series 1910–36, National Research Project of W. P. A.).

workers are found in greatest number in the cotton, sugar-beet, and truck-crop and fruit areas. There they can do the lighter kinds of work, like weeding, gathering fruits and vegetables, and picking cotton.

The United States extends from about 25° to 49° north latitude and from about sea level to 14,000 feet above. This means an extensive range of climate and soil conditions. Many thinly populated areas are found near the very heart of agricultural-production centers. These contrasting conditions partly account for the usual presence of migratory casual workers. The speed with which picking or harvesting must be done, in nearly all crops, is another reason.

Migratory workers are usually employed wherever the available local laborers are too few to harvest the grain, cotton, fruit, and vegetables. Individual workers or family groups often travel thousands of miles in a single year.

TO NORTH IN SPRING—TO SOUTH IN FALL

Outstanding characteristics of the maps are the lines showing northward or upward movement of operations and events in the spring, and the southward movement of activity in the fall. These movements progress at a rate of approximately 1° of latitude or 400 feet of altitude in 4 days. Climatic influences of the Great Lakes and of the oceans are evident on almost every map. In operations that can be performed during a long period the maps often indicate the effects of local competition for labor by other

crops, although the underlying control of general climatic conditions is not wholly obscured. Market demand may hasten the harvest of certain crops like potatoes.

Shortly after January 1, the sowing of spring oats begins in the extreme southern area. Corn planting may begin as early as February 1 in southern Texas, and by March 1, cotton planting begins there. The laborers required in these seeding and planting operations, together with those required in cultivating cotton and corn, contribute heavily to the steady rise in the index of seasonal employment to a high of about 116 percent by June 1. The maps make this clear.

A drop in the demand for laborers comes after June 1, extending through most of July, so that by August 1 employment is at a summer low even though many men are used to harvest small grain. With the cotton picking and the corn cutting, shocking, husking, and jerking, and other crop operations that come after August 1, the labor requirements in the country as a whole reach a second, or fall, peak of approximately 115 percent about October 1. The index of seasonal employment eases off after October 1. The low point of the year is reached about January 1 when farm employment is at about 80 percent of the annual average.

The figures shown on the maps and in the charts, and the inscriptions that follow give only the usual dates and labor requirements. Seeding dates given in the spring-wheat maps, for instance, indicate that in certain regions this operation begins about the first of April, becomes general about the middle of April, and ends about the first of May. These dates are based on many reports of actual practice; what actually occurs in any given year may differ by several days from these dates.

In certain areas where combines are used to harvest wheat and oats, the date of harvest is from 7 to 10 days later than that shown on the maps, for if this machine is to be used successfully the crop must be fully ripened and must have several days for drying.

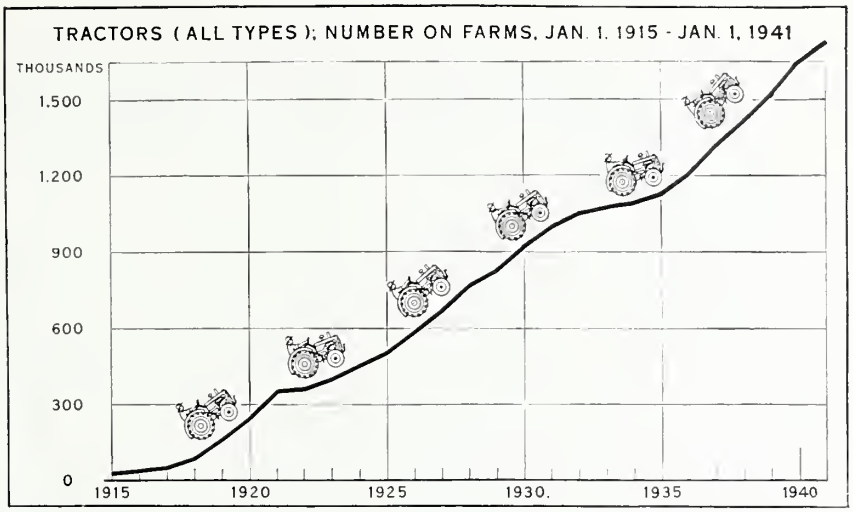

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FIGURE 3.—The increase in the number of tractors used on farms from January 1, 1915, to date has been phenomenal. From about 25,000 the numbers have been increasing on an average of over 50,000 a year up to January 1, 1941, when there were probably more than 1,650,000 tractors on farms. Fully four-fifths of the tractors sold in the United States in the last few years have been rubber-tired general-purpose tractors. With continued improvement in the design and the adaptation of tractors to more and more uses, the numbers on farms may continue to increase for years to come.

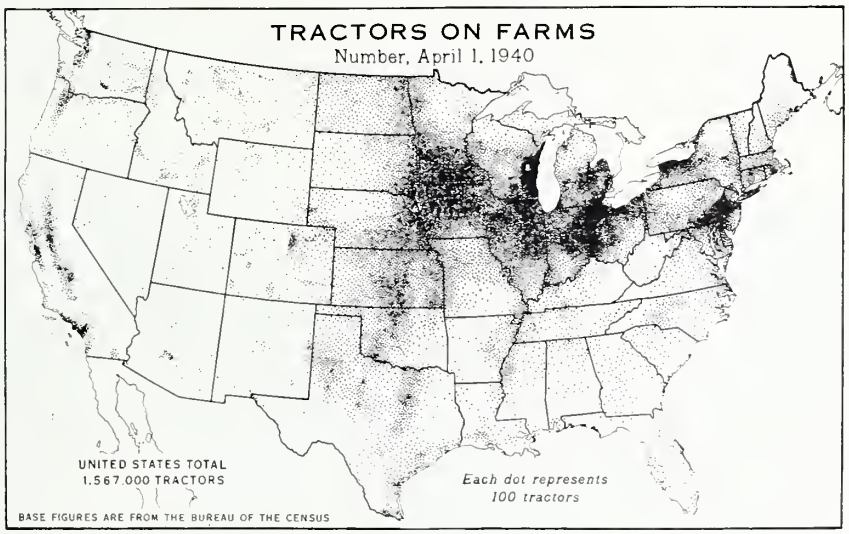

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FIGURE 4.—Heavy concentration of tractors on farms in the Corn Belt, Wheat Belt, Northeastern States, and the irrigated areas and valleys of the West has done away with the necessity of employing many of the extra laborers who were required before the use of tractors was adopted. The use of tractors instead of horses in the Corn Belt has been accompanied with the use of such equipment as combines and corn pickers. In the Wheat Belt the combine operated by tractor power has largely replaced the binders, headers, and the custom threshers and has reduced greatly the need of harvest labor. The number of tractors used in cotton production are relatively small compared to those used in corn and wheat production. This map shows a very light distribution of tractors in the eastern Cotton Belt. Practically all cotton is picked by hand and much more hand chopping is necessary in the eastern part of the belt than in the western dry areas where machinery is largely used for producing the crop.

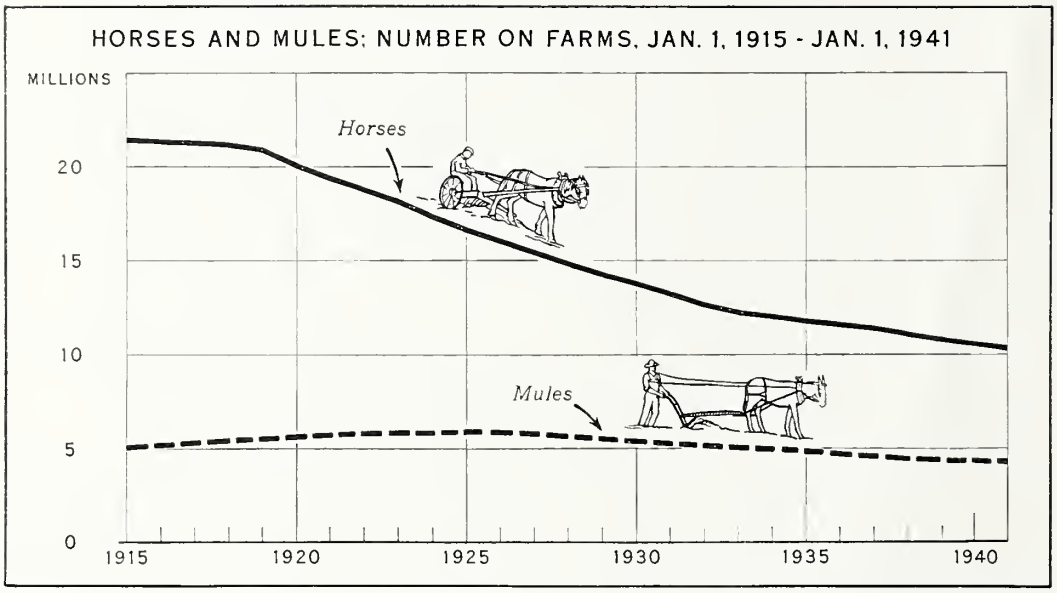

FIGURE 5.—Horses on farms have declined from an all-time high on January 1, 1915, of 21,431,000 to 10,364,000 on January 1, 1941, and mules have declined from a peak number of 5,918,000 on January 1, 1925, to 4,238,000 on January 1, 1941. Horses have declined more rapidly than mules, for mules are used more in the South, where adoption of tractors has been somewhat slower than in other regions. There were as many mules on farms on January 1, 1933, as on January 1, 1915, whereas horses had declined nearly 10,000,000 during that period.

FIGURE 6.—Two-bottom gang plows drawn with from four to six work animals are used fairly extensively for breaking land in the Corn Belt and in the northern Great Plains. The acreage of land plowed in a day with a two-bottom gang plow depends mainly on the depth plowed, the type of soil, and the number of work animals used. Around 4½ acres is considered about an average day's work for a two-bottom gang plow drawn by six work animals.

BAE 37791

FIGURE 7.—Tractor power is extensively used for plowing, especially in the Great Plains, the western Corn Belt, the Rocky Mountain region and on the Pacific Coast. The three-bottom mouldboard plow is probably used most extensively in the Great Plains and the western Corn Belt. From 10 to 12 acres is a fair day's work for a tractor pulling three 14-inch-bottom plows.

BAE 37781

FIGURE 8.—Disk harrows are used extensively in connection with seedbed preparation, especially in areas where the soil type is relatively heavy. Disk harrows are also used extensively for cultivating orchards. Disking is heavy work and in most areas tractor-drawn disks are in common use. With a two-plow tractor and a 10-foot tandem disk or a 10-foot spring-tooth harrow, from 20 to 25 acres are usually covered in a 10-hour day.

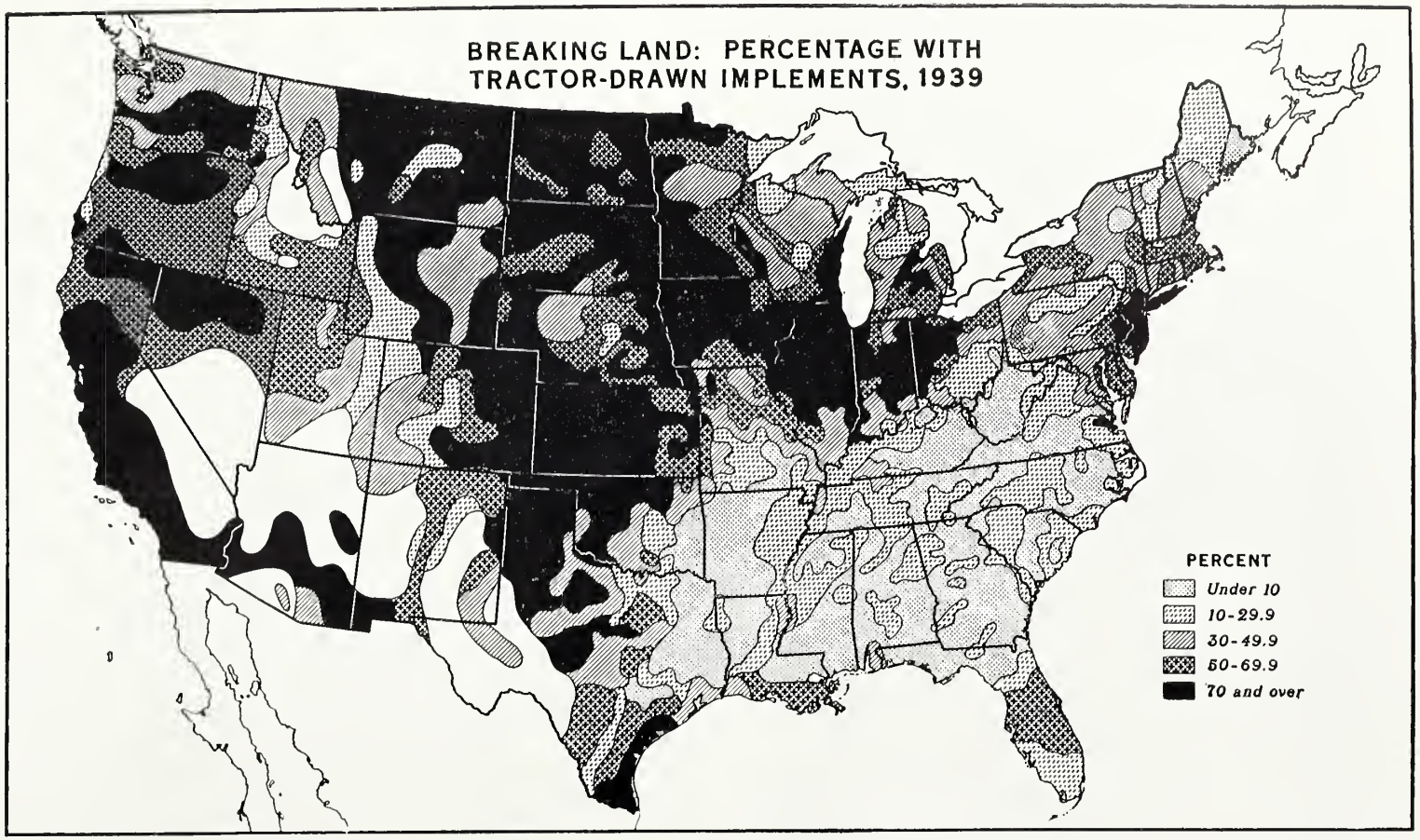

FIGURE 9.—More than 325 million acres of land are seeded to crops every year, and most of it is broken (plowed with mouldboard or disk plows, listed, or bedded) one or more times before being seeded. For the entire country about 55 percent of the land-breaking in 1939 was with tractor-drawn implements. Tractors furnished the bulk of the power for breaking land in most areas of the western half of the country and in the central Corn Belt; animal power was used principally in the southeastern part of the country and in most areas of the Northeast and in the South Central States. When the land was broken with tractor-drawn mouldboard plows two-bottom plows were most commonly used. A fair day's work for a tractor-drawn, two-bottom mouldboard plow is from 6 to 8 acres per day. A man and a two-horse team usually plow from 1.5 to 2 acres per day.

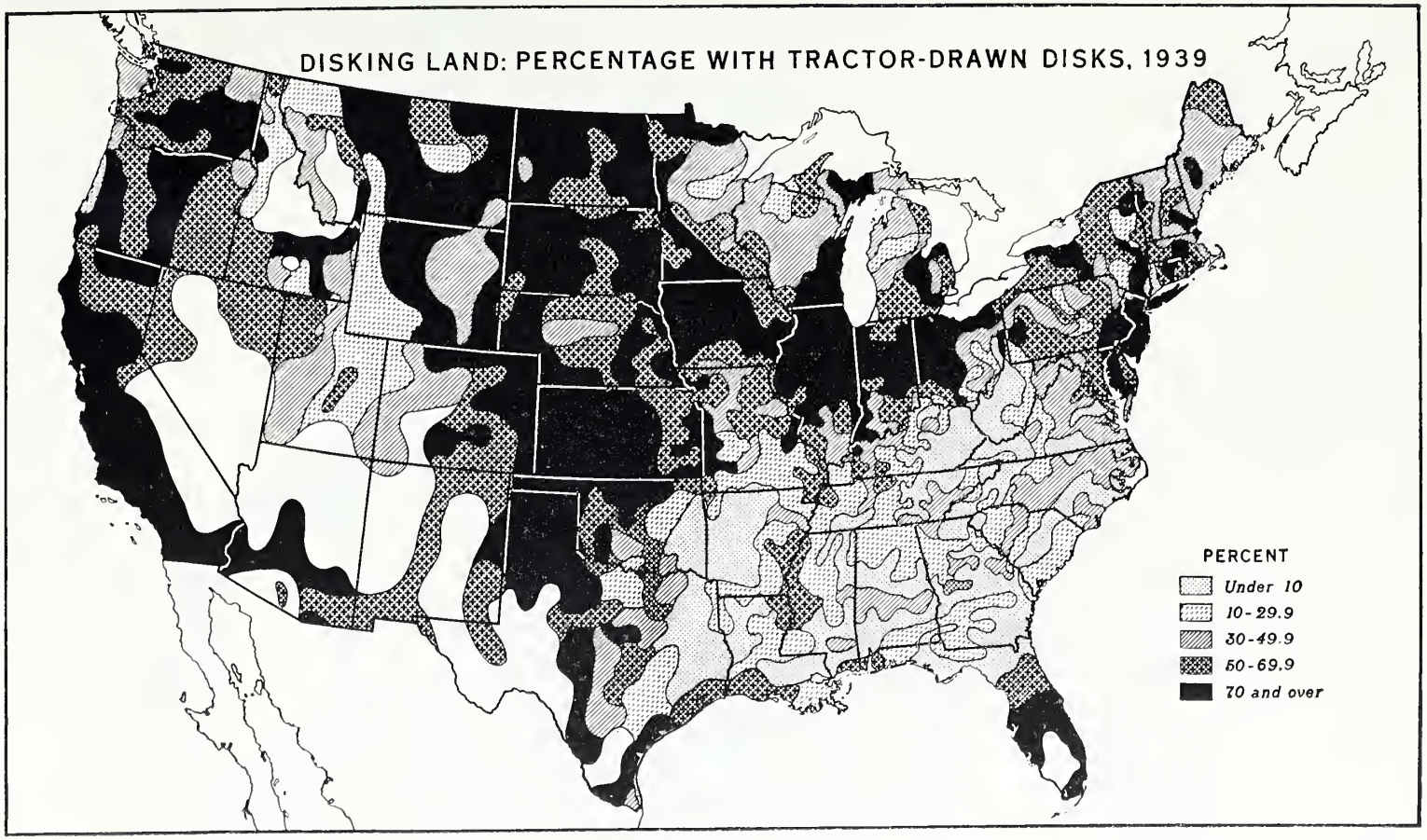

FIGURE 10.—Disking is common in practically all areas that produce tree fruits and tree nuts commercially and where soils are relatively heavy. Disking is a heavy-duty job, and tractors supplied the power for more than 55 percent of the work. Use of tractor power was most common in the central part of the country and along the Pacific coast. Animal power principally was used in the southeastern part of the country. When teams are used, about 1.5 acres of land can be disked per day for each foot of width of a tandem disk. When tractor power is used, approximately 60 percent more work can be done in a day.

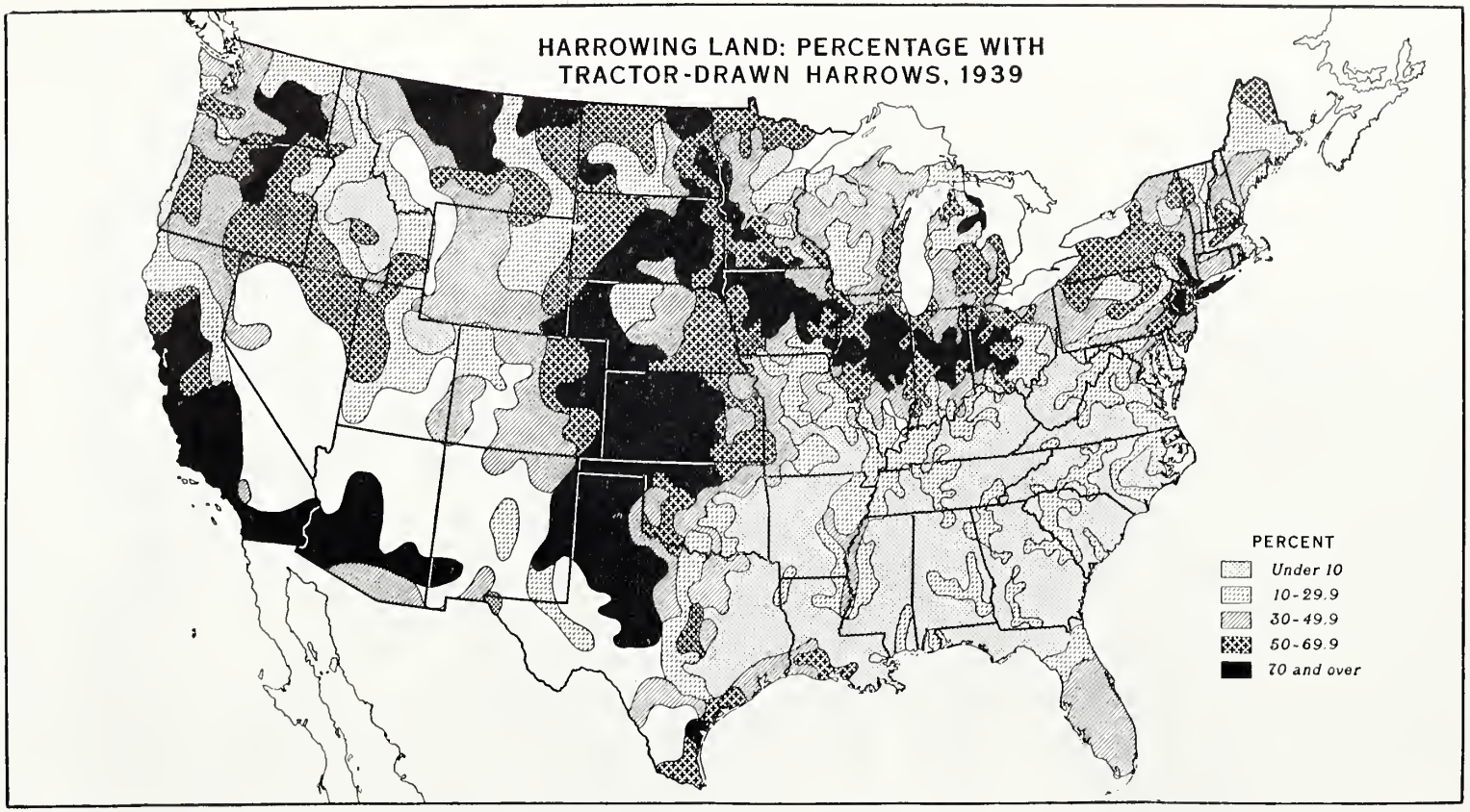

FIGURE 11.—Most of the 325 million or more acres of land that are seeded to crops annually are harrowed with the spike-tooth or spring-tooth harrow one or more times before seeding. Harrows are also used to some extent for cultivating field crops, and in connection with the seeding operation, especially for covering small-grain and grass seeds.

Harrowing is relatively light work and, for the country as a whole, work animals supplied the power for about 57 percent of the harrowing done in 1939. In most areas of the Southeast, animal-drawn harrows are commonly used. Teams of from two to four work animals are used, depending on the size of harrow. With a two-section spike harrow, one man and a two-horse team will harrow from 15 to 18 acres per 10-hour day. With the same crew and a spring-tooth harrow, 10 to 12 acres is a fair day's work.

In the central Great Plains, along the Pacific Coast, and in the central Corn Belt, tractor-drawn harrows are principally used. In these areas, a tractor-drawn harrow covers about 2½ acres a day per foot of width.

THE SMALL GRAINS

In the united states, as in most other countries of the world, the small grains occupy an important part of the total crop area. Of the cropland harvested in 1939 the small grains constituted about 32 percent. This is about the same proportion as in 1929. Directly or indirectly the small grains provide much of the food for people. Of the total small grains harvested, about one-fifth, measured in pounds, is used domestically for human food, and the remainder fed to livestock (including the bran, middlings, and other offal), exported, or used for seed.

In 1939 small grains were harvested from about 107,000,000 acres. These included wheat, (53,700,000 acres); oats, (33,000,000-acres); barley, (12,600,000 acres); rye, (3,800,000 acres); rice, (1,000,000 acres); flax, (2,300,000 acres), and buckwheat, (380,000 acres). The harvested area of corn and the grain sorghums was 97,000,000 acres.

A common rotation practiced by farmers in the agricultural center of the country, which extends from New York, Pennsylvania, and Virginia to about the western edge of the Corn Belt, consists of an intertilled cereal, usually corn, followed by a small grain, in which a hay crop is seeded.

In the southern part of this vast agricultural territory the length of the frost-free season permits the harvesting of corn in the fall, in time for the land to be prepared and seeded to winter wheat or winter barley. But in much of the northern part and notably in the central Corn Belt, where often 2 years of corn are included in the rotation and the acreage of corn is large, the corn is generally harvested late in the fall, and the preparing and seeding of the ground, mostly to oats, is postponed until spring. Timothy, red clover alsike, and alfalfa when grown as a nurse crop, are seeded at the same time as the spring-sown small grains.

In these central and southern parts of the western Corn Belt when timothy is seeded with wheat or winter barley, it is usually seeded in the fall followed by red clover or alsike in the spring or occasionally alfalfa. After the small-grain crop is harvested in late June or July, the hay crop comes on. It often provides one cutting in the fall, particularly in the southern part of this territory.

But large acreages of small grains, especially wheat, are grown in the subhumid and semiarid country to the west of this agricultural territory, commonly without rotation. This wider extent of the small-grain crops than of the hay crops is indicated by the fact that the area of hay in the United States harvested in 1939 was only 65 percent of the small-grain acreage.

BAE 37786

FIGURE 12.—Manure spreaders are used principally on farms where fairly large numbers of livestock are kept in barns or on feed lots, especially during the winter season. With manure spreader, about 1 hour of labor is used for hauling and spreading a ton of manure. When manure is hauled in wagons and distributed by hand methods, about 2 hours of labor is usually needed per ton. Besides saving labor, a spreader applies the manure more uniformly on the ground than hand methods. For the entire country, 58 percent of the total manure applied to crop and pasture land in 1939 was applied with spreaders.

It is estimated that the gross production of farm manures in this country amounts to about 1 billion tons annually. Most of this manure is dropped on pasture land, large quantities are wasted, but relatively large quantities (about 250 million tons) remain to be hauled out from barns and feed lots and applied to crop and pasture land every year. Most of this manure is produced in the Corn Belt and in the northeastern dairy States, where livestock numbers are large and where winter grazing is limited.

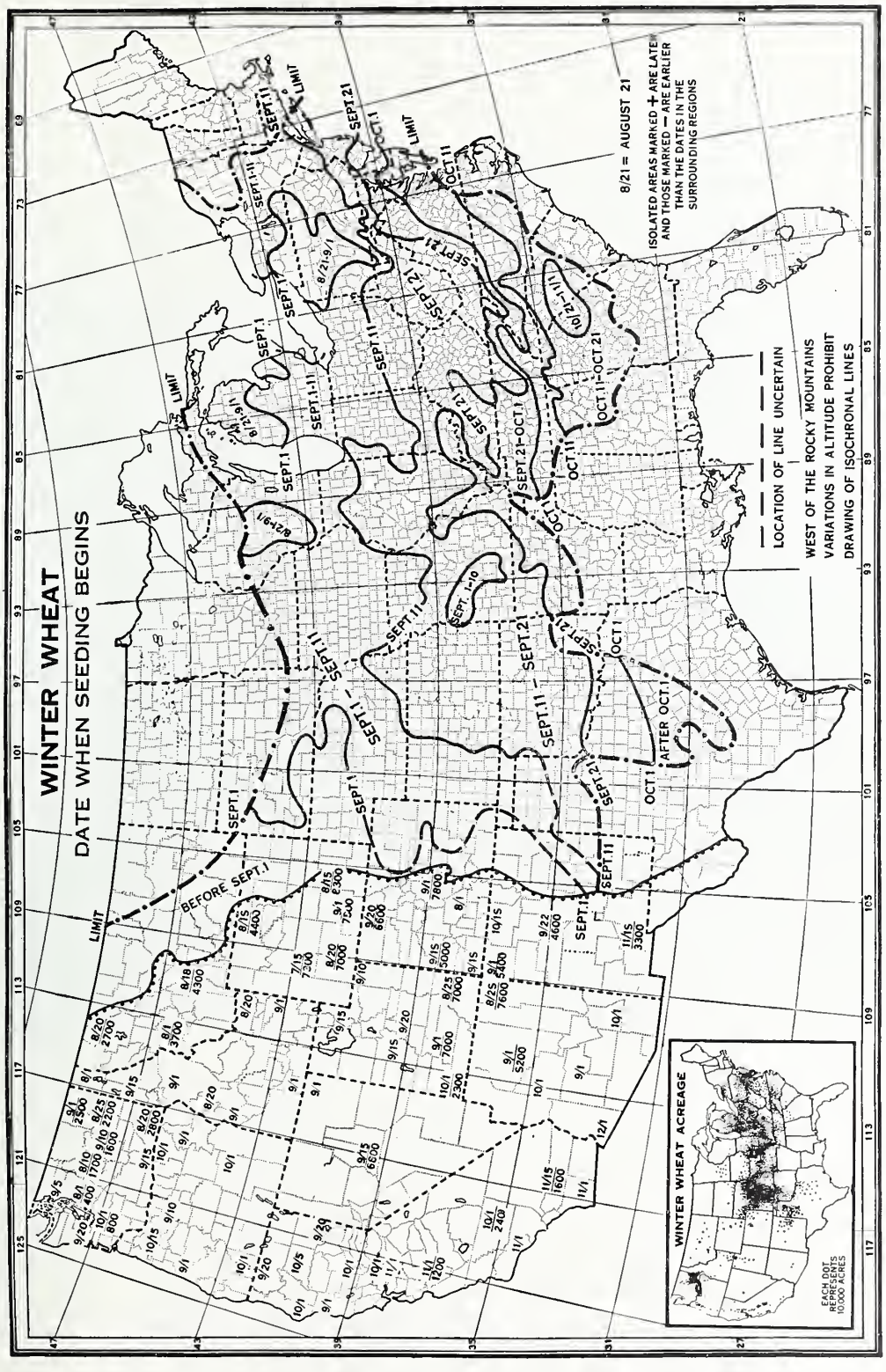

FIGURE 13.—The hard-winter-wheat area (Kansas, Oklahoma, and Nebraska, and adjacent parts of Colorado and Texas) contains fully one-half the winter-wheat acreage in the United States. Lack of moisture, especially in the Great Plains areas, may materially delay seeding in some years. In most central and southern wheat areas the seeding dates shown on the map, which represent the practice of most farmers, are so early as to invite injury by the Hessian fly. (Numbers under date figures on this and similar maps show elevation).

455271°—42——2

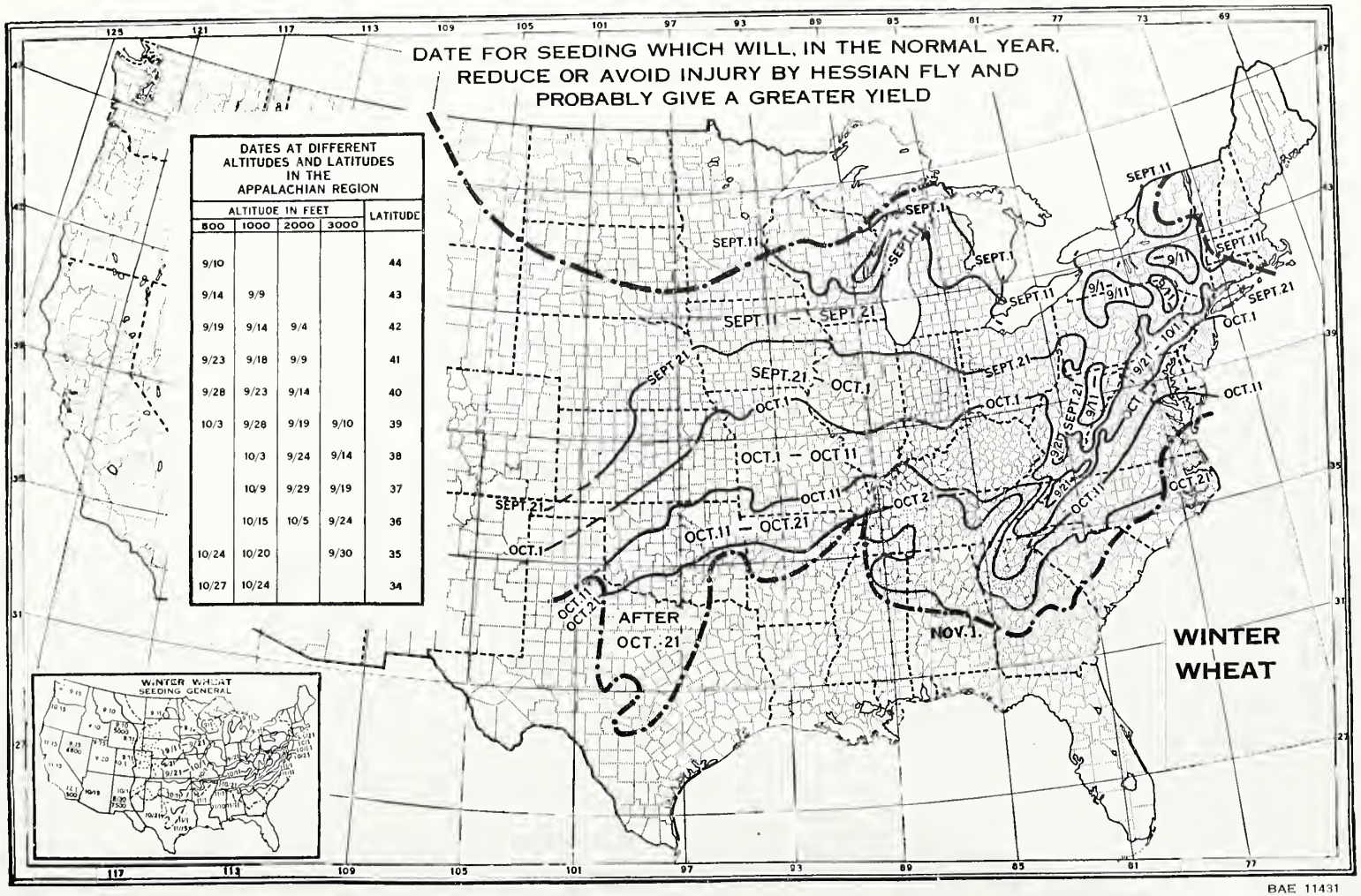

FIGURE 14.—Results of experiments in various States show that when the Hessian fly is prevalent best yields may be expected when seeding occurs just after the emergence of the last autumn brood of the fly; and that when the fly is not numerous, the best time for seeding is about a week earlier. In years when the fly is prevalent it is advisable to seed after the fly-free date. South of the thirty-ninth parallel and east of Kansas, the autumn is long enough to allow seeding after the average date of emergence of the fly. If planting is delayed to this date relatively favorable yields are likely to be obtained.

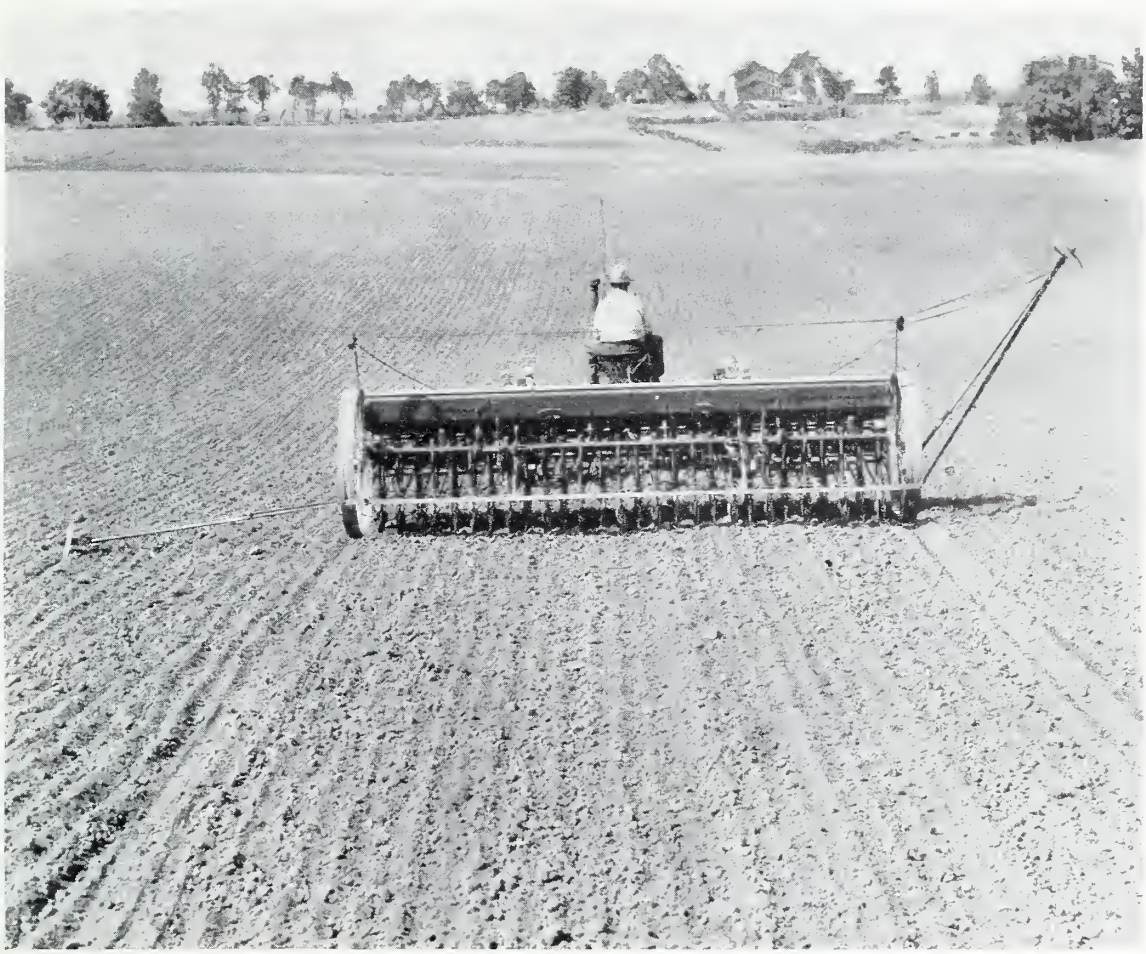

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FIGURE 15.—Almost half of the drilling of small grains is done with tractor-drawn drills. These drills are used most extensively in the Great Plains, in the Pacific Coast States, and in the western Corn Belt. Under favorable conditions from 40 to 45 acres can be drilled a day with a 14-foot tractor-drawn drill. With the same size drill about 50 percent more work can be done with tractor power than with animal power.

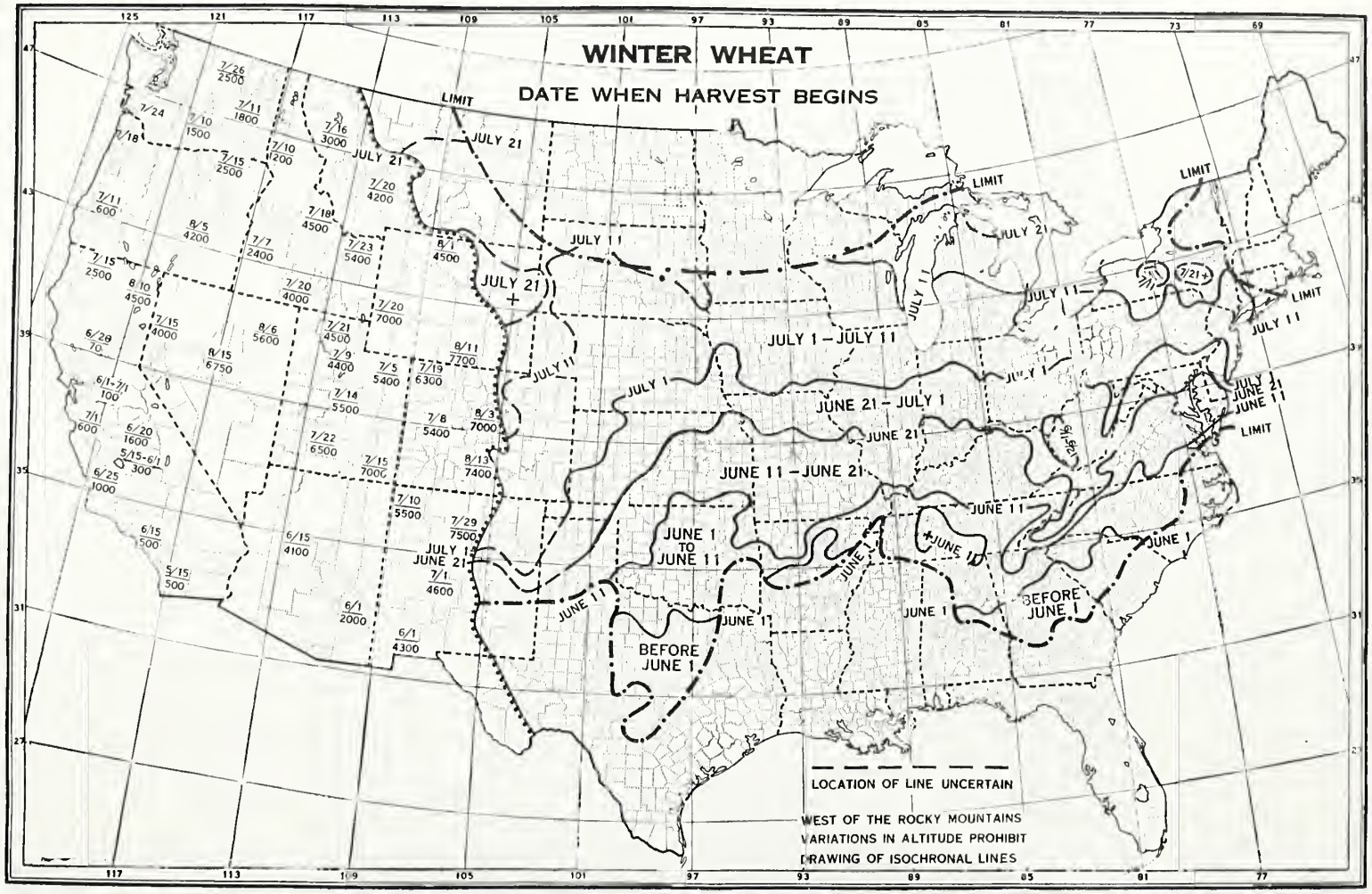


FIGURE 16.—The harvest of winter wheat begins in central Texas usually about May 25, but harvesting is of little importance until it is begun in central Oklahoma about June 5. Formerly an army of transient harvest hands assembled in this section, reaching maximum size in Kansas. The men came from the South upon completion of the harvest there and from the cities and other centers of employment in the East. Some were local laborers from adjacent towns and villages. Now most farmers use combines and with family labor handle the harvest without much hired help.

WINTER WHEAT
DATE WHEN HARVEST IS GENERAL
JULY 11–JULY 21
JULY 11–JULY 21
JULY 11
JULY 1
JUNE 21
JULY 11
JULY 1
JULY 11
JULY 21
JULY 1

FSA 9365 C

FIGURE 18.—The cradle began taking the place of the sickle for harvesting small grain in this country about 1800. It was considered a great improvement. In 1830, the small grains here and in other parts of the world were harvested mainly with the cradle and sickle. In 1880, about 20 percent of our small-grain acreage was harvested by these hand methods, while only 1 percent are now so harvested. It takes two workers about a day to cut, bind, and shock 2 acres of small grain.

F 13200

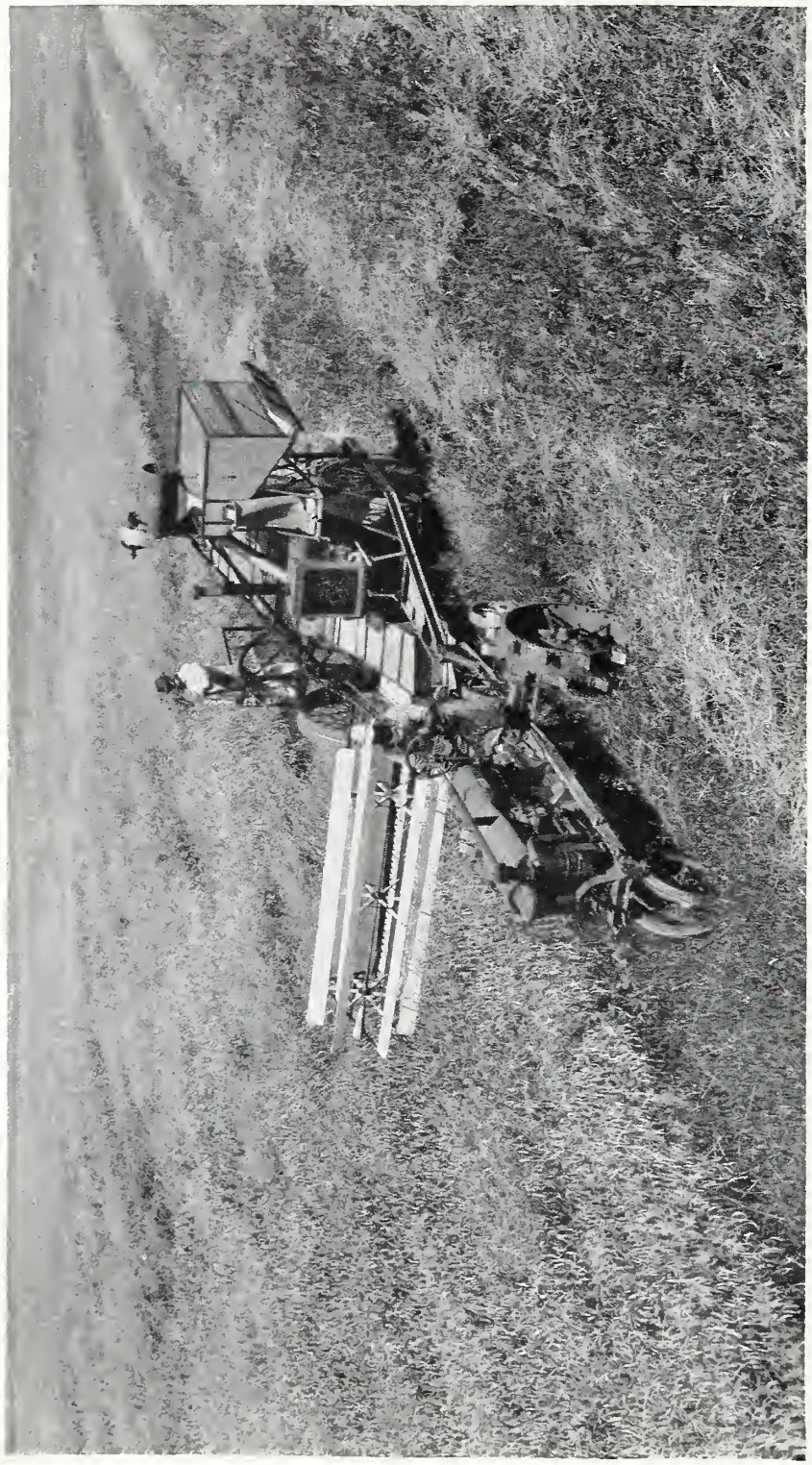
FIGURE 19.—Before the coming of the combine, the header was used extensively for harvesting small grains, especially wheat, in the subhumid parts of the Great Plains and in the Pacific Northwest. By 1920, only about 20 percent of the wheat acreage was harvested with the header, and today only about 1 percent is so harvested. A 12-foot header, with a crew of about 6 men and 12 horses, can usually cut and stack about 30 acres of 15-bushel wheat in a 10-hour day.

BAE 37790

FIGURE 20.—Tractor power has come into extensive use for operating binders for small grain. Many of the tractor-drawn binders are the same binders that were previously operated with animal power, and they require a two-man crew. With the power binder, however, one man can operate both the tractor and the binder. In the major small-grain areas where the fields are large and level, tractor binders can cut about 3 acres a day for each foot of cutter bar. From 2 to 2.5 acres a day per foot of width is a fair achievement when the fields are of small size.

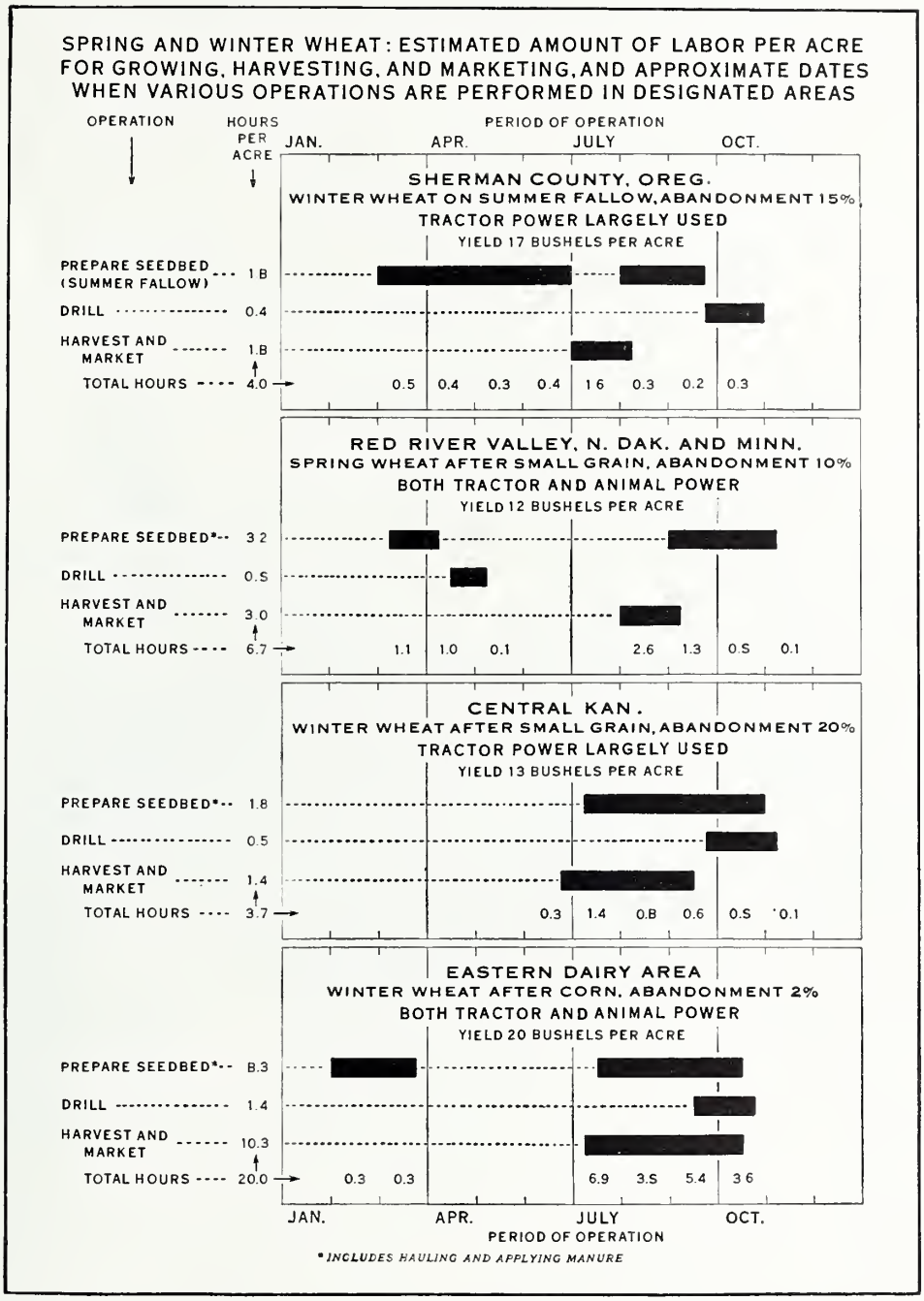
BAE 19489

FIGURE 21.—A grain binder was used for more than half of the acreage of small grains harvested in 1940 and practically all this grain was shocked immediately after being cut. Labor used per acre for shocking varies with the yield. In the Eastern States, 1.5 hours of man labor is generally used for shocking when the per-acre yield is around 20 bushels of wheat, or its equivalent in other small grains. Only about half this amount of labor is usually needed in the Great Plains where the per acre yield of small grains is below the average for the country as a whole.



BAE 37789

FIGURE 22.—Combined harvester-threshers have been used in the Pacific Coast States for more than 50 years. The first combines were animal-drawn, the thresher separator being operated by ground power. Now virtually all combines are tractor-drawn and the thresher separators are operated by mechanical power. Combines were introduced in the Great Plains about 1917. Their use expanded rapidly, and in the southern and central Plains practically all the wheat is now combined. The machines are now found in all parts of the country. Sizes vary from 40 inches to more than 20 feet in width of cutter bar. The large sizes predominate in the large small-grain areas, and the small sizes are found in areas where acreage of small grain is limited. Large-size combines are equipped with mounted motors which operate the thresher separator; small combines are usually operated with tractor-power take-off. From 2 to 2½ acres per foot of width are usually cut in a 10-hour day by the large combine. The acreage cut with the small combine is somewhat greater as they are usually mounted on rubber, while the large sizes usually have steel wheels.


SPRING AND WINTER WHEAT: ESTIMATED AMOUNT OF LABOR PER ACRE FOR GROWING, HARVESTING, AND MARKETING, AND APPROXIMATE DATES WHEN VARIOUS OPERATIONS ARE PERFORMED IN DESIGNATED AREAS
OPERATION
HOURS PER ACRE
PERIOD OF OPERATION
JAN.
APR.
JULY
OCT.
SHERMAN COUNTY, OREG.
WINTER WHEAT ON SUMMER FALLOW, ABANDONMENT 15%
TRACTOR POWER LARGELY USED
YIELD 17 BUSHELS PER ACRE
PREPARE SEEDBED (SUMMER FALLOW) 1.8
DRILL 0.4
HARVEST AND MARKET 1.8
TOTAL HOURS 4.0
0.5 0.4 0.3 0.4 1.6 0.3 0.2 0.3
RED RIVER VALLEY, N. DAK. AND MINN.
SPRING WHEAT AFTER SMALL GRAIN, ABANDONMENT 10%
BOTH TRACTOR AND ANIMAL POWER
YIELD 12 BUSHELS PER ACRE
PREPARE SEEDBED* 3.2
DRILL 0.5
HARVEST AND MARKET 3.0
TOTAL HOURS 6.7
1.1 1.0 0.1 2.6 1.3 0.5 0.1
CENTRAL KAN.
WINTER WHEAT AFTER SMALL GRAIN, ABANDONMENT 20%
TRACTOR POWER LARGELY USED
YIELD 13 BUSHELS PER ACRE
PREPARE SEEDBED* 1.8
DRILL 0.5
HARVEST AND MARKET 1.4
TOTAL HOURS 3.7
0.3 1.4 0.8 0.6 0.5 0.1
EASTERN DAIRY AREA
WINTER WHEAT AFTER CORN, ABANDONMENT 2%
BOTH TRACTOR AND ANIMAL POWER
YIELD 20 BUSHELS PER ACRE
PREPARE SEEDBED* 8.3
DRILL 1.4
HARVEST AND MARKET 10.3
TOTAL HOURS 20.0
0.3 0.3 6.9 3.5 5.4 3.6
JAN.
APR.
JULY
OCT.
PERIOD OF OPERATION
* INCLUDES HAULING AND APPLYING MANURE

BAE 39348

FIGURE 23.—Relatively little labor is used in the Pacific Northwest and in the southern Great Plains, where farms are large and where large power units are used extensively. The combine harvest method prevails in these areas. It is estimated that about 4.0 hours of labor are used to grow, harvest, and market an acre of wheat. Labor needs are somewhat higher in the Red River Valley, where animal power is more extensively used and where binder-thresher methods prevail to a greater extent. In the eastern dairy areas, where the wheat fields and machines are relatively small and the crop is harvested largely by the binder-thresher method, more labor is used than is needed in the principal grain-producing areas.

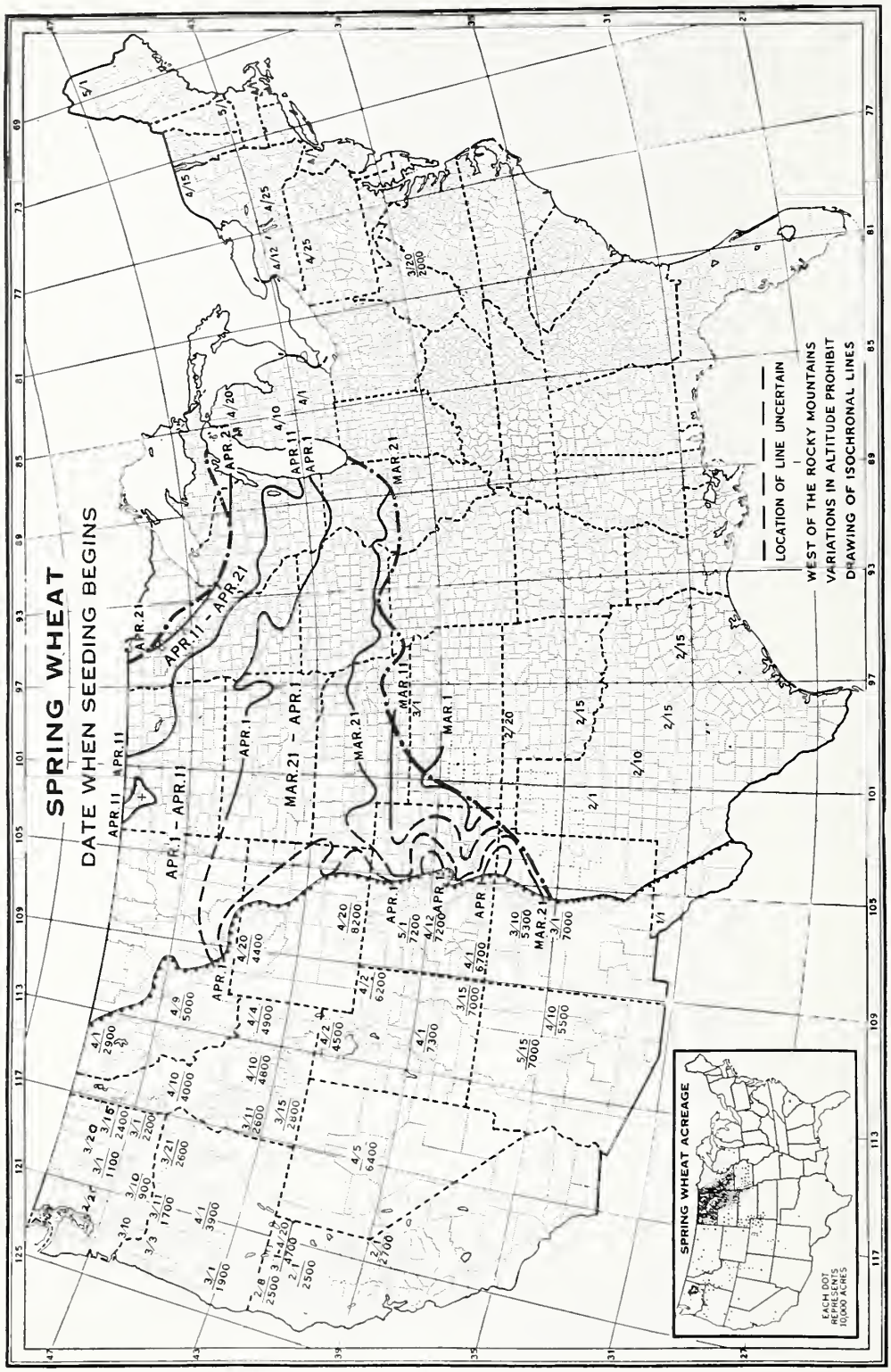


FIGURE 24.—Minnesota, the Dakotas, and eastern Washington produce over three-fourths of the spring wheat grown in the United States. The seeding of spring wheat begins in northeastern Nebraska and western Iowa usually about March 21, and during the following 10 days it begins throughout most of South Dakota and in the part of Minnesota that lies south of the Minnesota River. By April 11, it begins in northern North Dakota and north-central Minnesota. In northern Minnesota and at higher altitudes in the West, seeding usually begins about April 21 or even later.

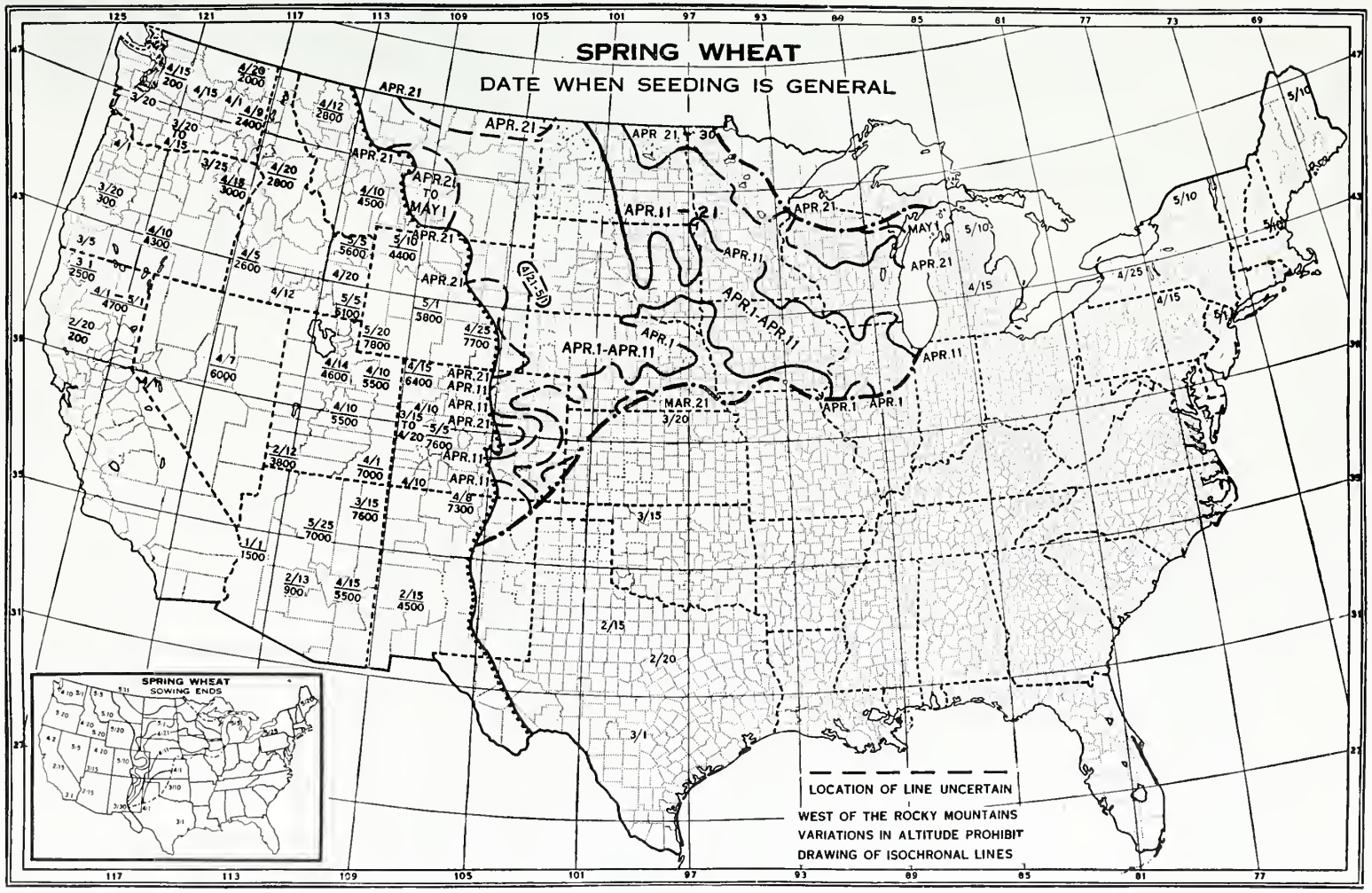


FIGURE 25.—The usual duration of the period of seeding spring wheat is about 20 days in Nebraska, where the acreage is small, 30 days in northern South Dakota, 35 days in northern North Dakota, and 30 to 40 days in eastern Washington. In the northern Great Plains, about two-thirds of the wheat follows wheat or other small grain. On tractor-operated farms in this region when wheat is seeded after small grains, approximately 1.5 hours of man labor and 1.5 hours of tractor work are used to prepare the seedbed and seed an acre of wheat. These figures are to be compared with an average of about 2.5 man-hours and 10 horse-hours per acre for horse-operated farms.

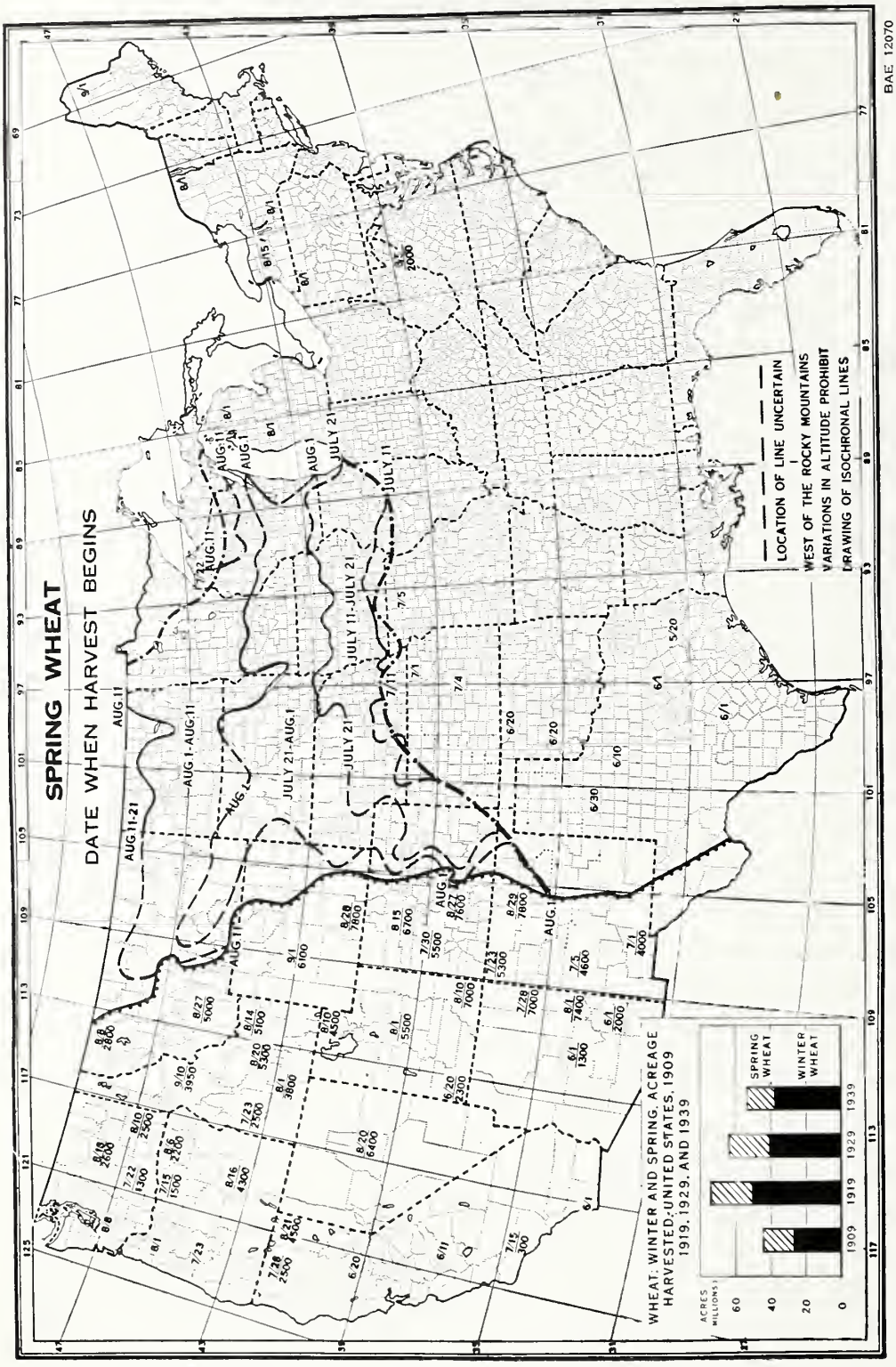


FIGURE 26.—The harvesting of spring wheat begins in eastern Nebraska and western Iowa usually about July 15. By August 1 wheat harvest has begun throughout South Dakota and southern Minnesota and by August 11 it has reached the Canadian line. In eastern Washington and Oregon spring-wheat harvest begins about July 15 in the warmer river valleys, but not until August 10 on the high plateaus. About 25 years ago the many thousands of transient laborers for the harvest in Minnesota and the Dakotas, came mostly from States to the south, where they had been employed in harvesting winter wheat, and from the logging camps in the Great Lakes area. Now the farmers, aided by machinery and family labor and local hired labor do most of the work.

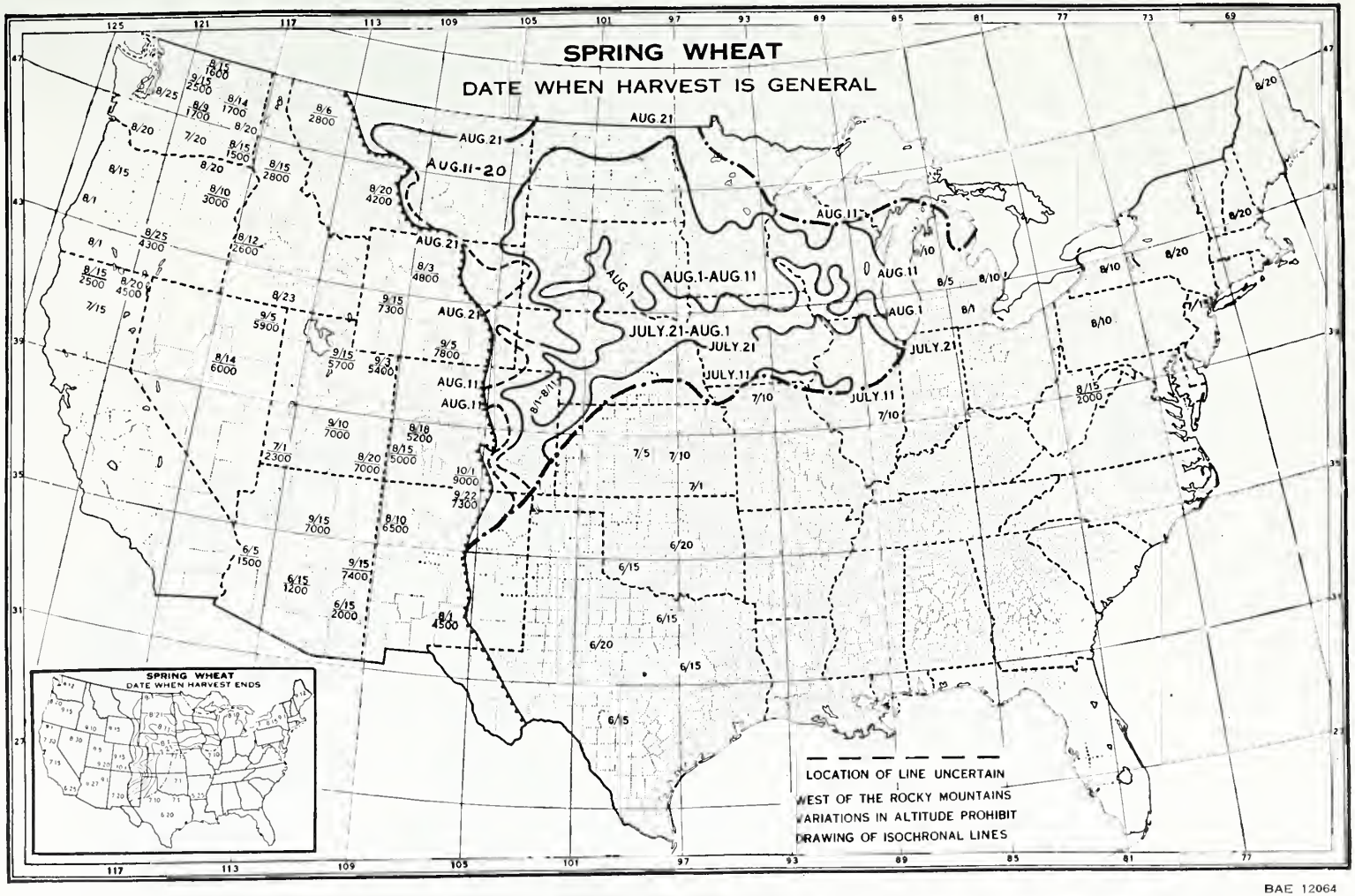


FIGURE 27.—Most of the spring wheat in the United States is harvested in normal years between July 20 and September 1, and practically all of it by September 20. In the northern Great Plains, harvesting with the binder and threshing with the stationary separator are the most common methods; although an appreciable acreage is harvested with the combine, especially in the more western parts of the region. In the Pacific Northwest, wheat is commonly harvested with the combine. Owing chiefly to the rolling topography, larger yields, and the sack handling of much of the grain, the labor used in harvesting and marketing an acre of wheat in this region is about 75 percent more than that in the Great Plains.

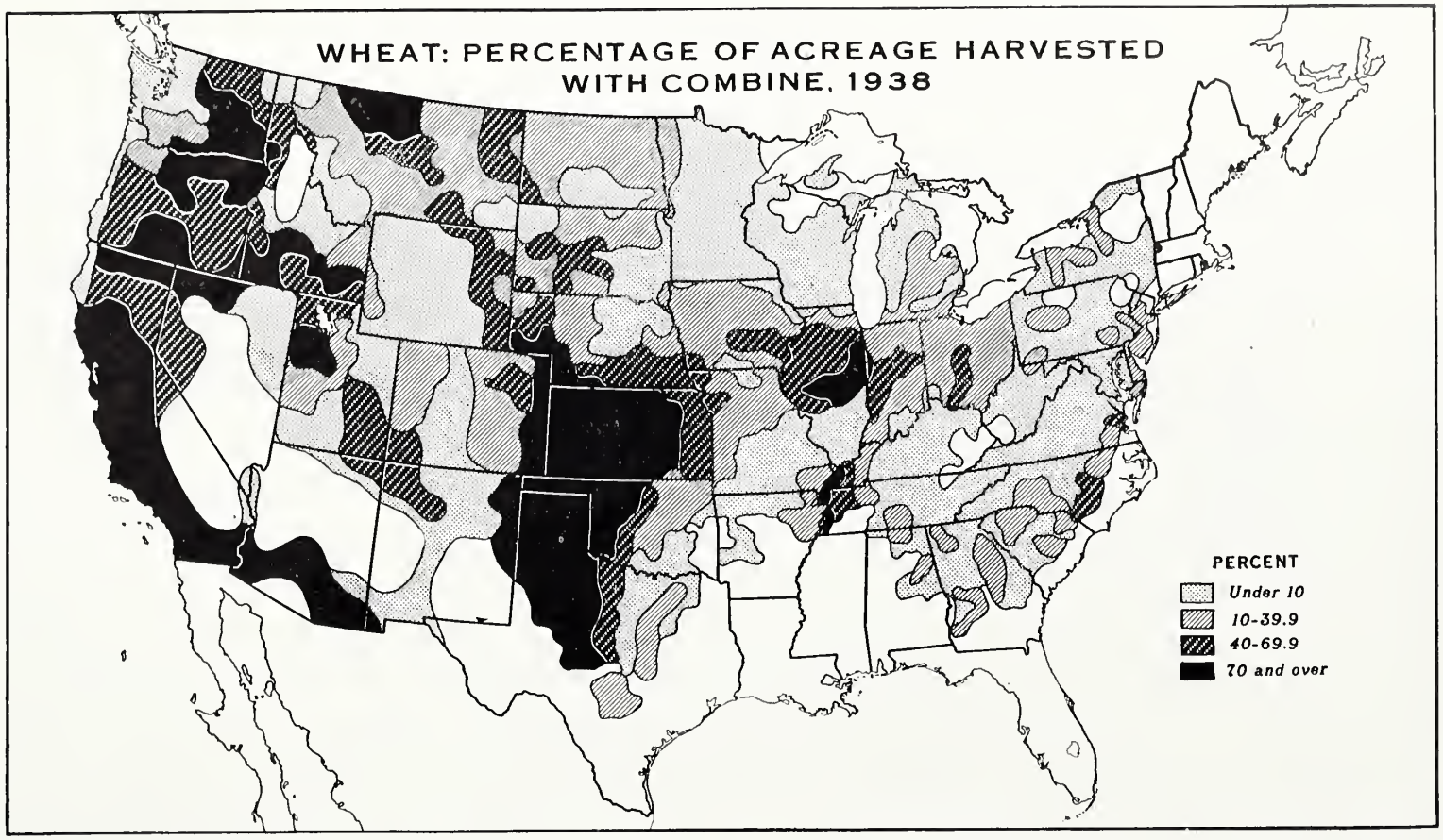


FIGURE 28.—The combine was used for harvesting 49 percent of the wheat acreage in the United States in 1938. Binders accounted for 47 percent of the acreage, and 4 percent was harvested by all other methods, principally by the use of headers and cradles. The combine method prevailed in the southern Great Plains and in principal wheat areas of the Pacific Coast and Mountain States. The binder method is still important in the northern Great Plains, the Corn Belt, and the eastern wheat areas, but the use of the combine has increased greatly since the advent of the small combine. The combine method has the greatest advantage on farms that have relatively large acreages of wheat and where but little value is placed on the straw. From 1 to 1½ hours of labor per acre is commonly used to harvest an acre of wheat by the combine method, from 5 to 8 hours by the binder-thresher method, from 4 to 5 hours by the header-thresher methods, and about 20 hours by the cradle-thresher method.

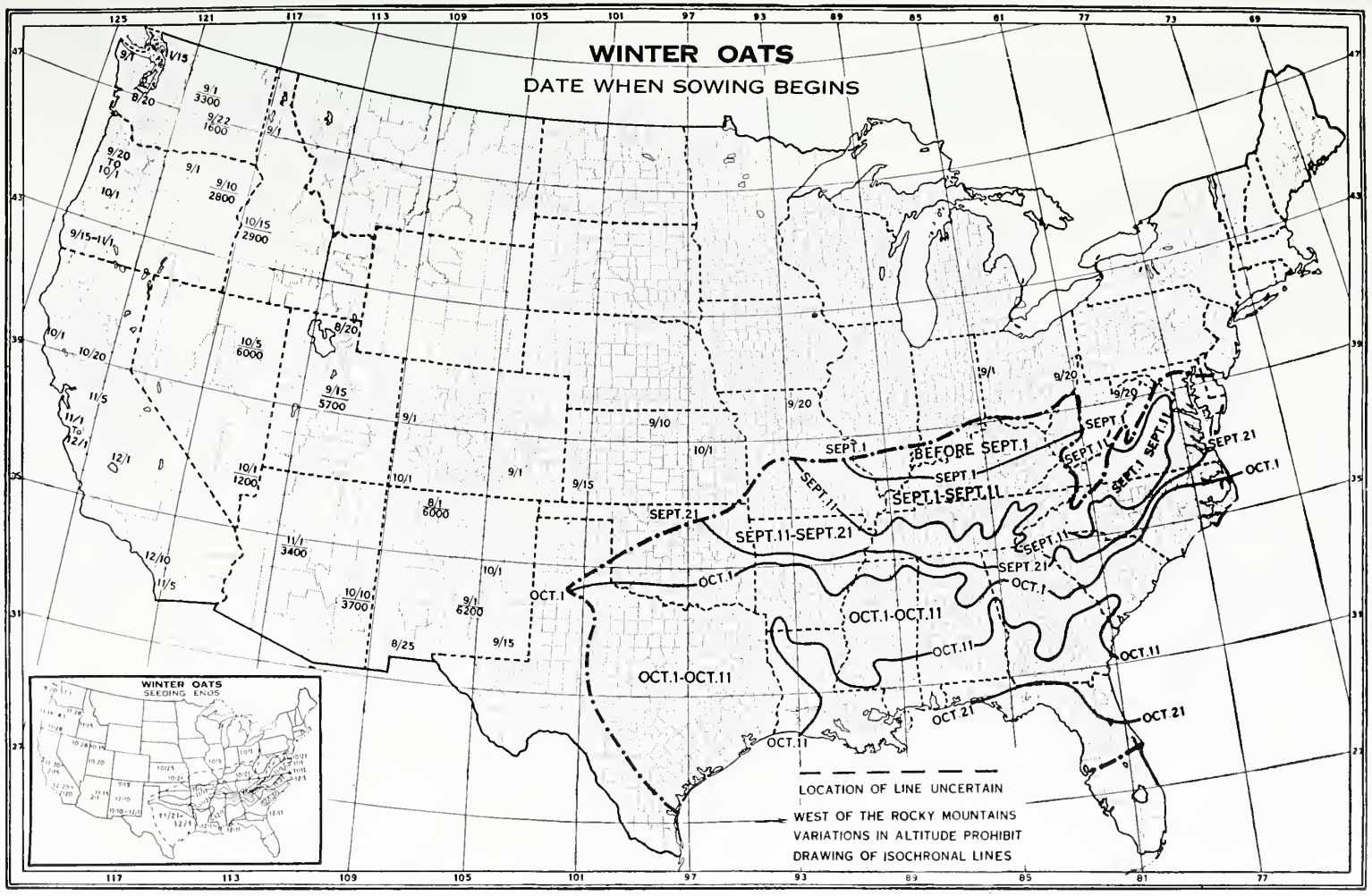


FIGURE 29.—Winter oats are grown mostly where the average winter temperature exceeds 35° and hence are important only in Southern States and along the Pacific Coast. Seeding begins in the Ohio and Potomac Valleys usually about September 1 and ends about October 1; along the northern margin of the Cotton Belt seeding begins about September 21 and may continue 30 to 50 days; and finally in northern Florida it begins about October 21 and is over by December 15. Winter oats in all these sections are mostly a minor crop and seldom require extra labor. In the South, preparing the seedbed and seeding an acre of oats requires in general 6 to 10 hours of man labor and 15 to 25 hours of horse or mule labor. To produce an acre of winter oats requires from 10 to 20 hours of man labor.

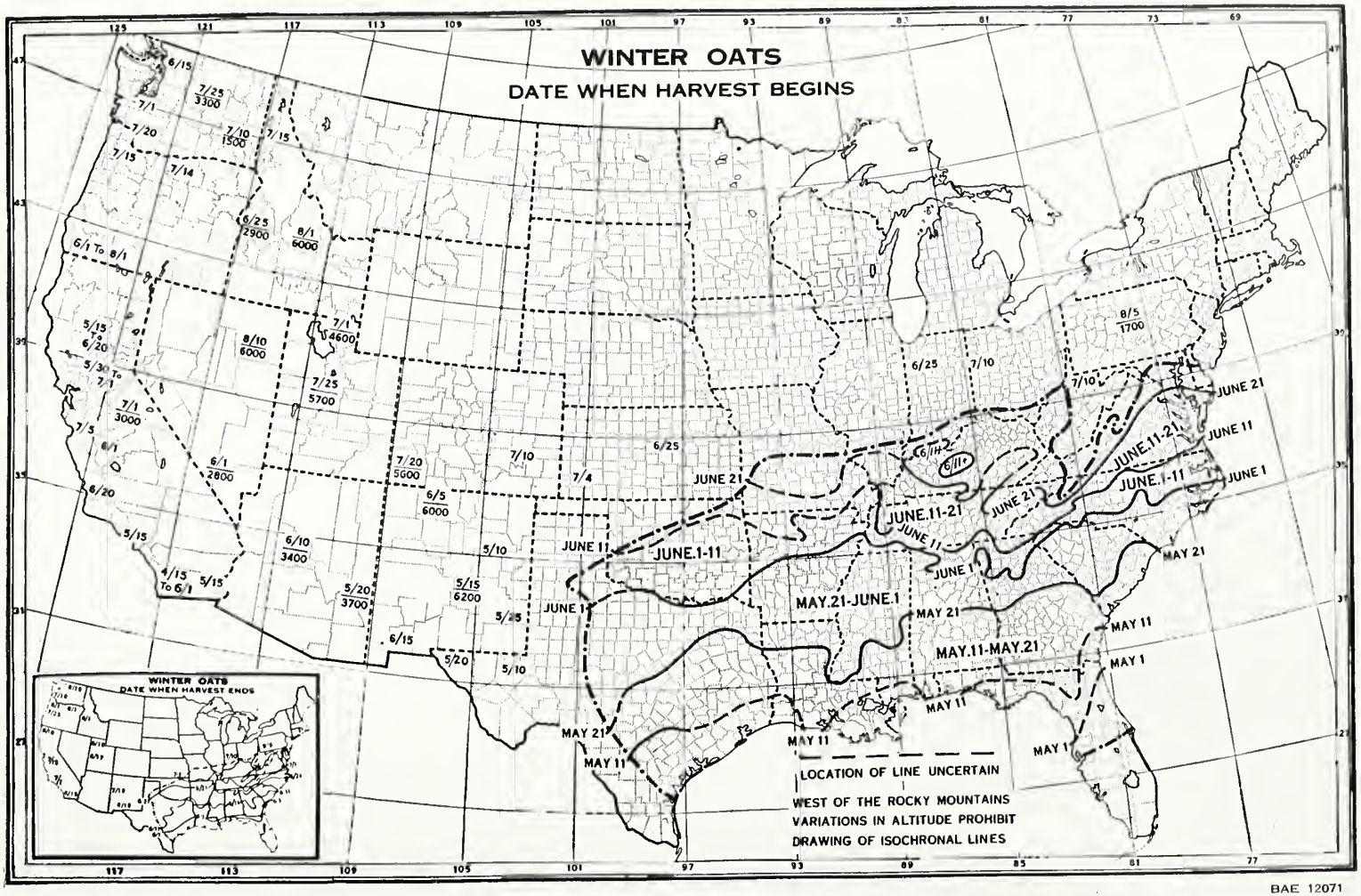


FIGURE 30.—The harvesting of winter oats begins along the Gulf Coast early in May and progresses northward across the Cotton Belt at the rate of 10 to 15 miles a day, reaching the northern boundary of the Cotton Belt about June 11 and the lower Ohio and Potomac Valleys usually by June 21. The winter oats harvest ends along the Gulf Coast usually by June 1, and in the Ohio and Potomac Valleys before July 11. Labor and power for harvesting oats vary widely with the harvest method used. Where winter oats are cut with a mower or binder and fed unthreshed from 4 to 6 hours of man labor and about the same hours of horse or mule work are used per acre for harvesting. About 2 additional hours of man labor and animal work are commonly used when the grain is threshed.

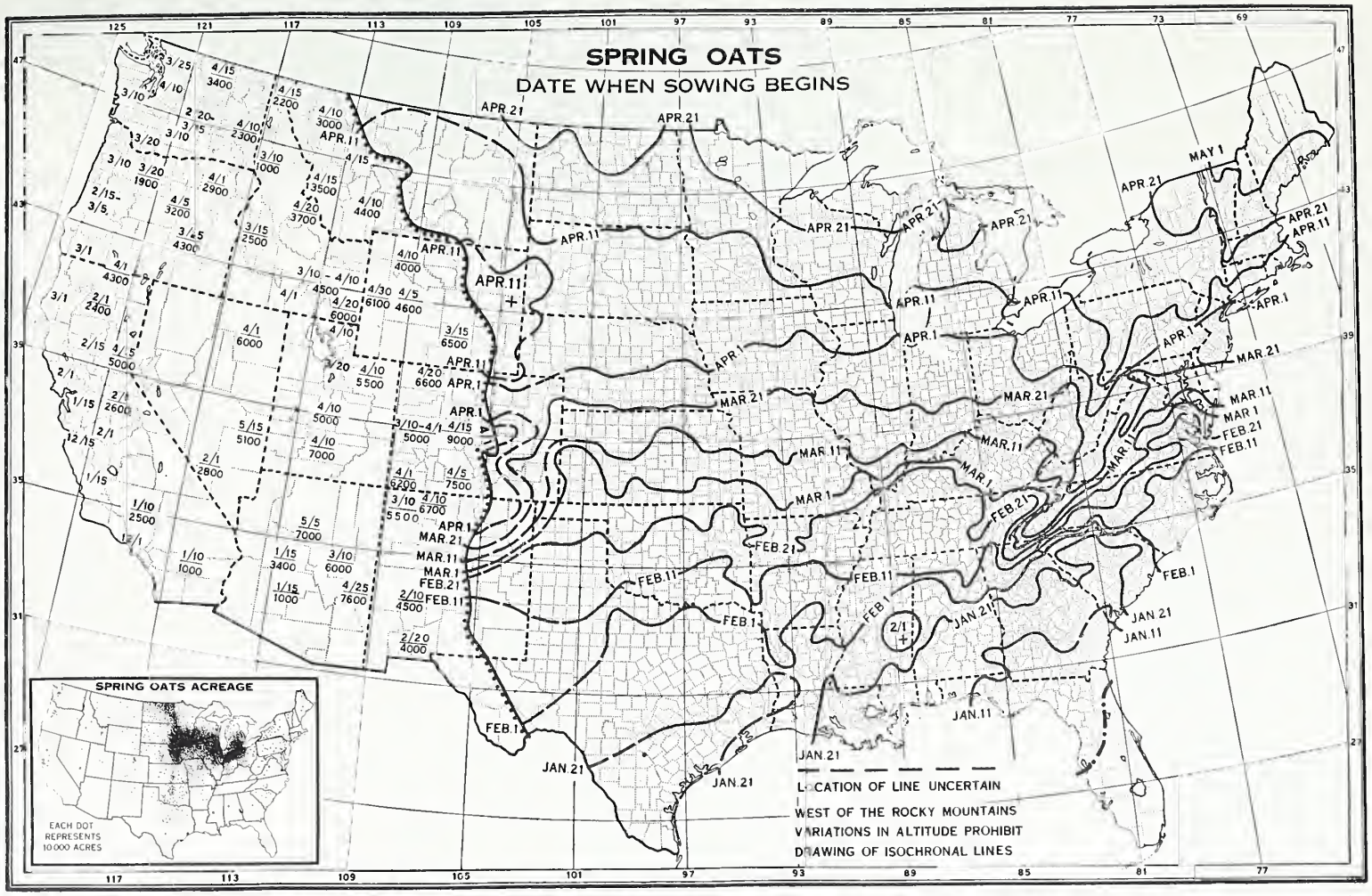

SPRING OATS
DATE WHEN SOWING BEGINS
SPRING OATS ACREAGE
EACH DOT REPRESENTS 10,000 ACRES
LOCATION OF LINE UNCERTAIN WEST OF THE ROCKY MOUNTAINS VARIATIONS IN ALTITUDE PROHIBIT DRAWING OF ISOCHRONAL LINES
BAE 12072

FIGURE 31.—More than 85 percent of the spring oats are produced in the North Central States. In the Corn Belt, oats are sown in the spring before corn-planting time and are harvested in July after the corn is laid by. There is therefore little competition with the more profitable corn crop for labor at the critical times of the year. In the spring-wheat area of the Northwest there is some competition for labor for the seeding of oats and wheat, but as the oats are usually sown 10 days later than the wheat they serve to lengthen and make less strenuous the seeding season.

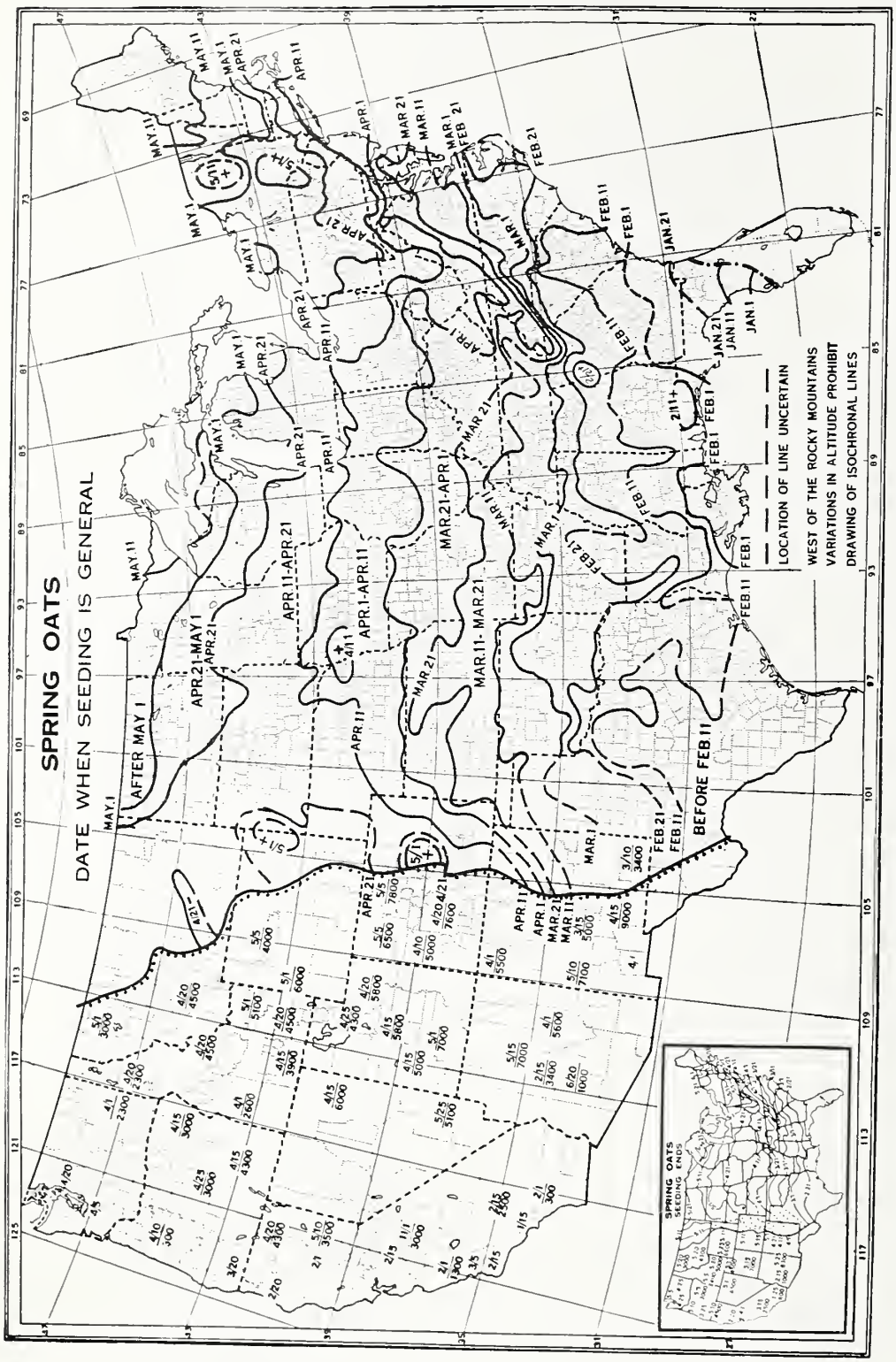


FIGURE 32.—Seeding of spring oats begins in the lower part of the Ohio and Potomac River valleys in early March, is general in late March, and is over by the middle of April; in central Illinois seeding begins in late March and ends around the middle of April; in northern Iowa it begins early in April and ends about April 20; and along the Canadian line in North Dakota it begins in late April and is finished a month later. For preparing land and seeding an acre of spring oats in the eastern areas of the northern Great Plains and in the western Corn Belt, about 2.5 man-hours, 6 horse-hours, and 0.5 tractor hour are used per acre. Considerably more labor and power are commonly used in preparing land and seeding spring oats in most other parts of the country.

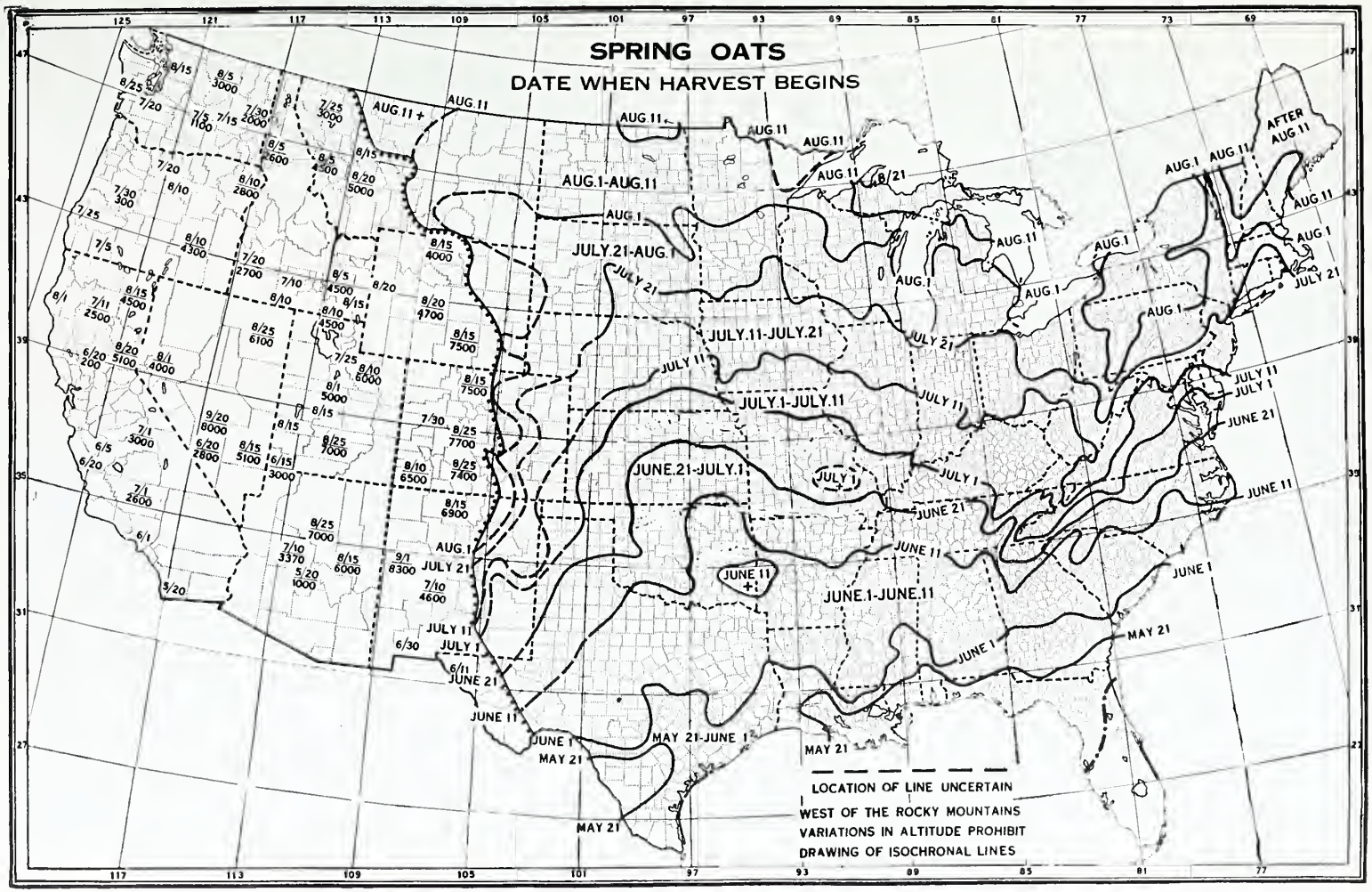


FIGURE 33.—Harvest of spring oats begins along the Gulf Coast in late May and progresses northward up the Mississippi Valley at the average rate of 14 miles a day until, in the middle of August, it crosses the boundary into Canada. Along the Atlantic and Pacific coasts the rate is somewhat less rapid. Most of the spring oats acreage is harvested with a binder and threshed from the shock with a stationary separator. In the North Central States with binder-thresher method 5 to 8 hours each of man labor and horse work are commonly used per acre for harvesting and threshing oats that yield from 30 to 40 bushels per acre. Only about 10 percent of the acreage was harvested with the combine in 1938.

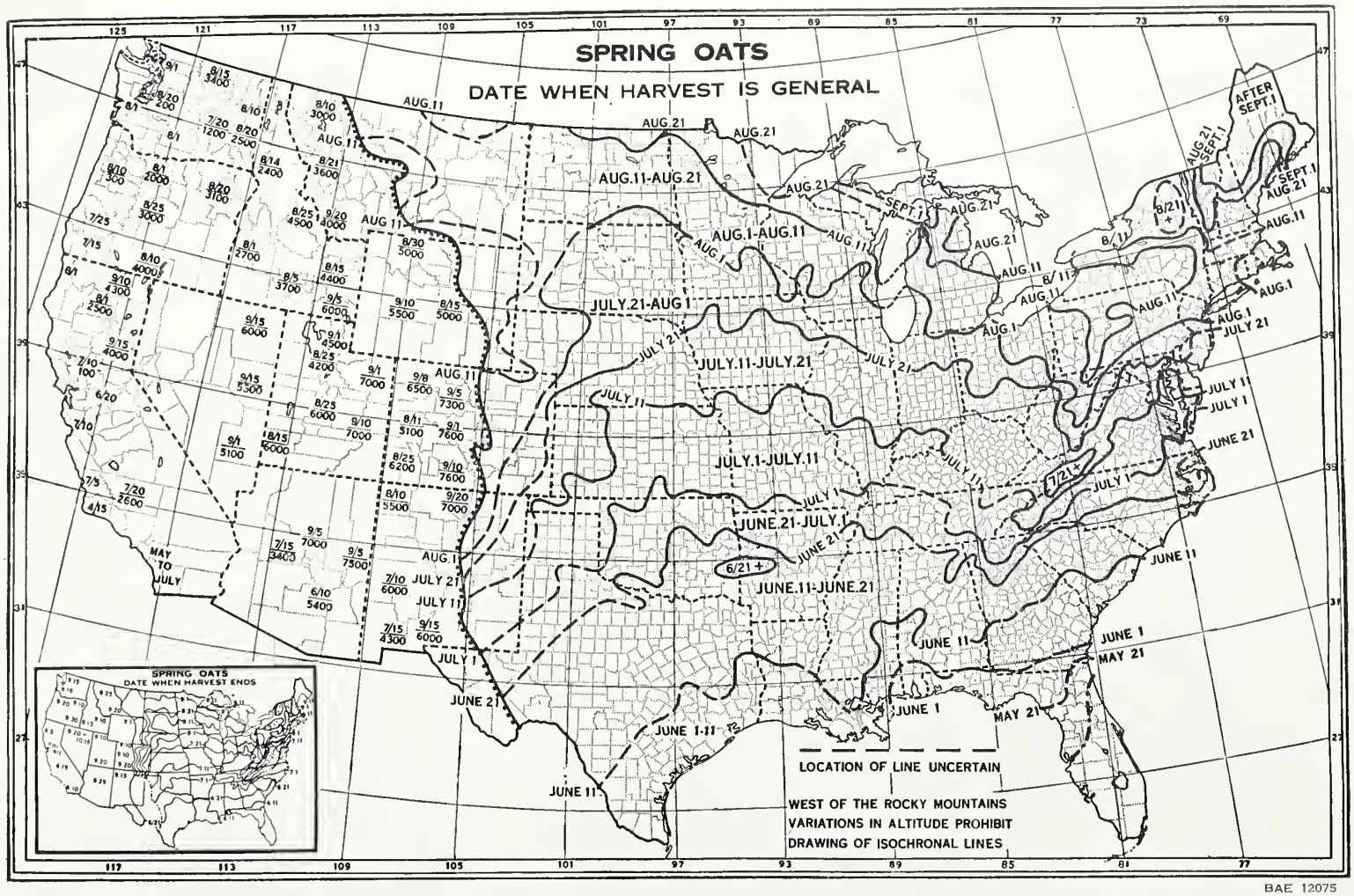


FIGURE 34.—The harvest season for oats is later in the Eastern States than at the same latitude and altitude in the Central and Far West. In Minnesota, the Dakotas, and eastern Washington this harvest seriously overlaps that of spring wheat.

In the western Corn Belt, where the land is prepared mainly by disking, the seed broadcasted and the crop harvested largely by the binder-thresher method, from 6 to 8 hours of man labor are usually needed for growing and harvesting an acre of oats. In New York and Pennsylvania much of the oat land is plowed before seeding, and the oats are harvested chiefly with a binder and often threshed from the stack. In these States it takes about 20 hours of labor to grow, harvest, and thresh an acre of oats.

BAE 37788

FIGURE 35.—Threshing small grain from the stack with a stationary thresher is fairly common in the eastern dairy States. The modern thresher is equipped with a straw stacker, but extra men are sometimes used for stacking to get storm-resistant stacks. When the grain is harvested with a binder, is stacked, and is threshed with a stationary thresher, from 10 to 12 hours of labor is ordinarily used for harvesting and threshing an acre of small grain yielding the equivalent of 20 bushels of wheat.

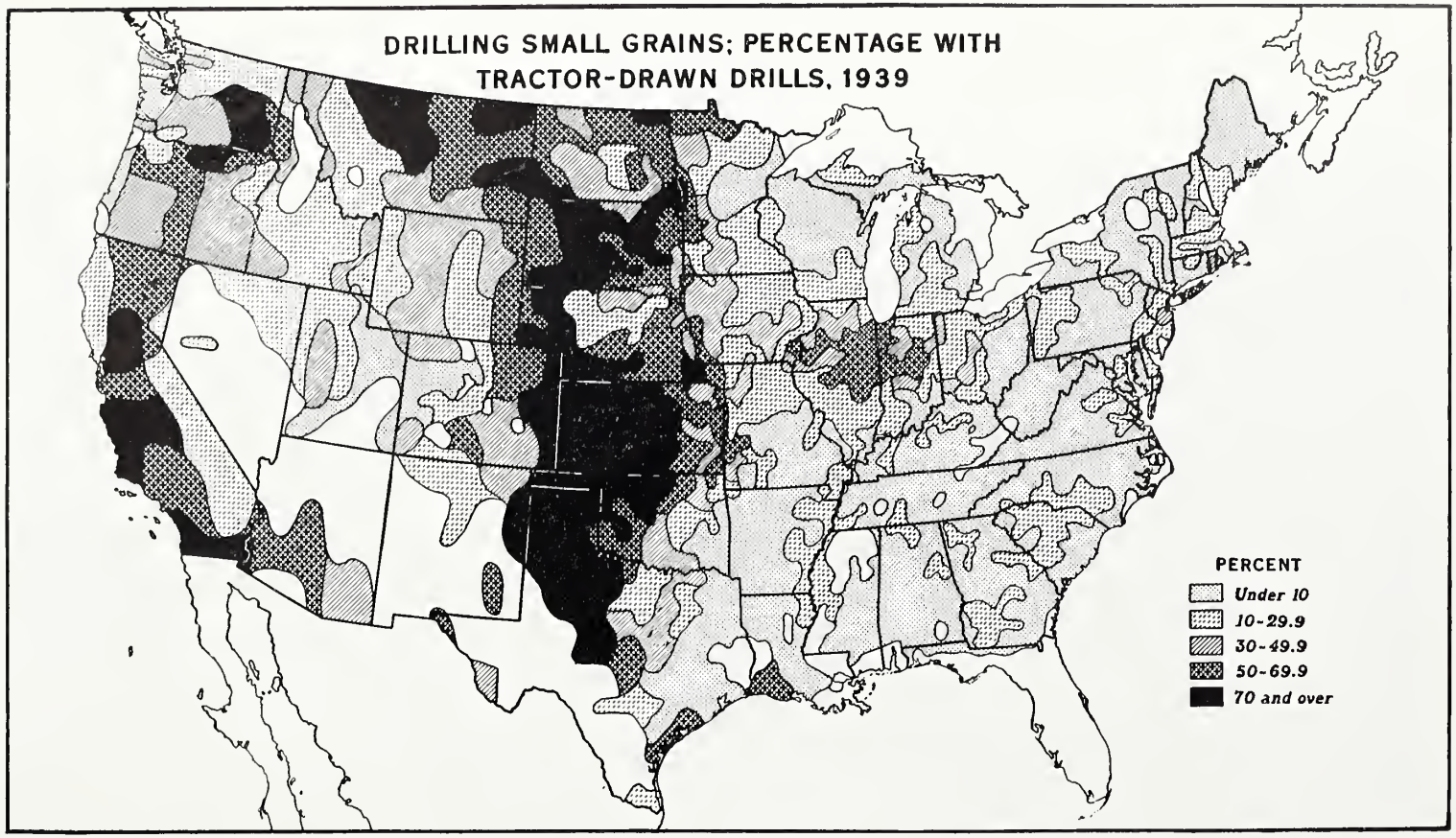


FIGURE 36.—More than 120 million acres of small grain (wheat, oats, barley, rye, flax, rice, and buckwheat) were seeded in 1939. Probably about 75 percent of this acreage was drilled, and the remainder was broadcast. For the entire country about 48 percent of the drilling was done with tractor power and 52 percent with animal power. In the wheat areas of the Great Plains and along the Pacific coast, where the farms are commonly of large size and where relatively large acreages of small grains are grown per farm, most of the drilling was done with tractor power. In these areas, a 20-foot grain drill, operated by a two-man crew and drawn by a three-plow tractor, will seed from 50 to 60 acres per day. In other parts of the country, animal power was generally used except in isolated areas. With a 7-foot animal-drawn drill from 12 to 14 acres are usually seeded per day.

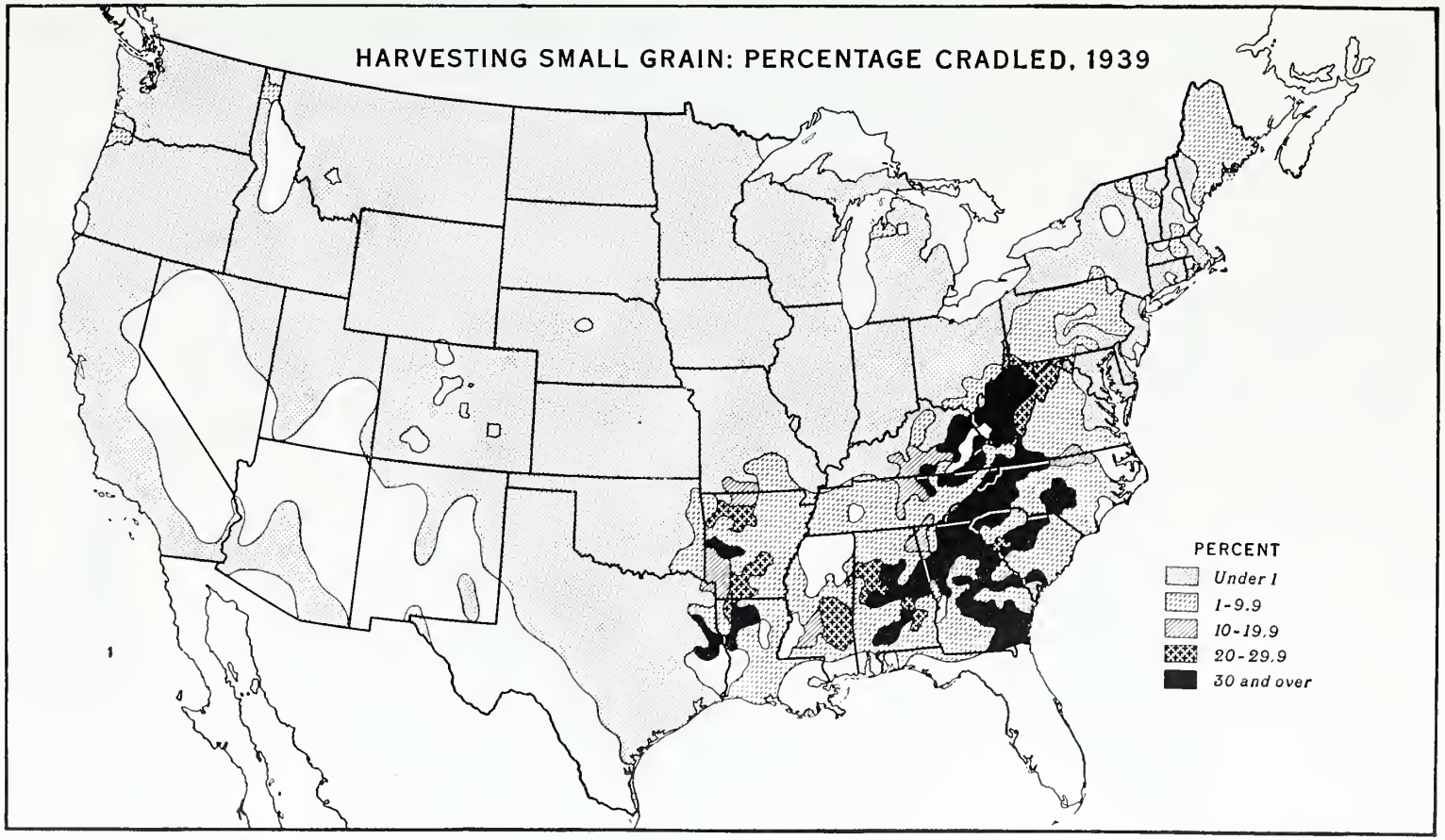


FIGURE 37.— Only about 1 percent of the small grains (wheat, oats, barley, rye, flax, rice, and buckwheat) was cradled in 1939. This was around 1 million acres of small grains. Use of the cradle is confined mostly to farms having only a few acres of small grain chiefly in the mountain and hilly areas of the southeastern States. The cradle, however, was used to some extent in eastern Oklahoma, in eastern Texas, in most States along the Atlantic seaboard, and in some isolated western areas.

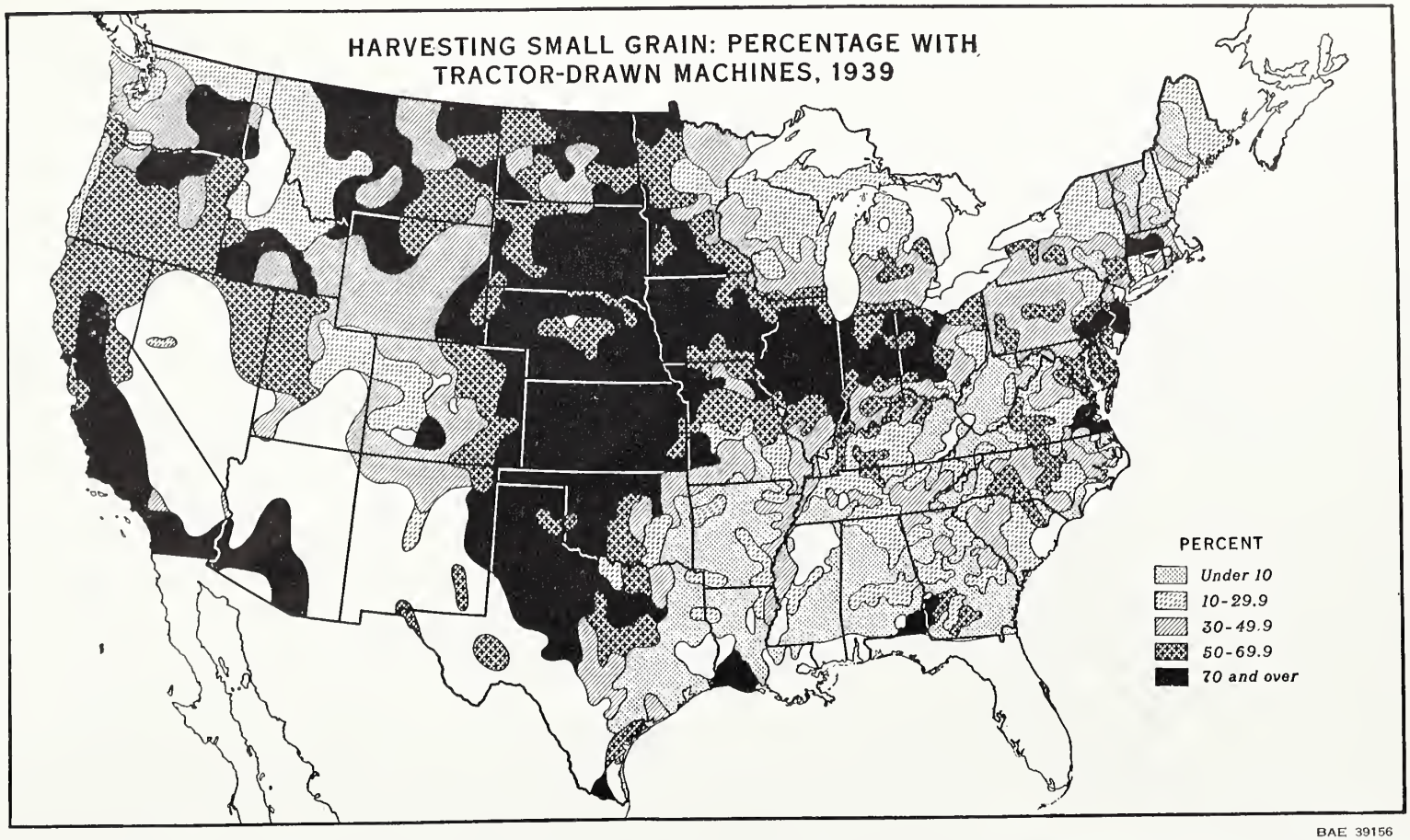


FIGURE 38.—About 107 million acres of small grain (wheat, oats, barley, rye, flax, rice, and buckwheat) were harvested in 1939. Tractor-drawn machines, principally combines and binders, harvested 69 percent of this acreage and animal-drawn machines 30 percent. One percent was cradled. In the Great Plains, along the Pacific Coast, and in the north-central Corn Belt, tractor power was used extensively for harvesting small grains. Its use was also important in the small-grain areas of the Rocky Mountain States and in some other parts of the country. In the southern Corn Belt, in most northeastern areas, and in most parts of the Cotton Belt, tractor power was not used extensively for harvesting small grains.

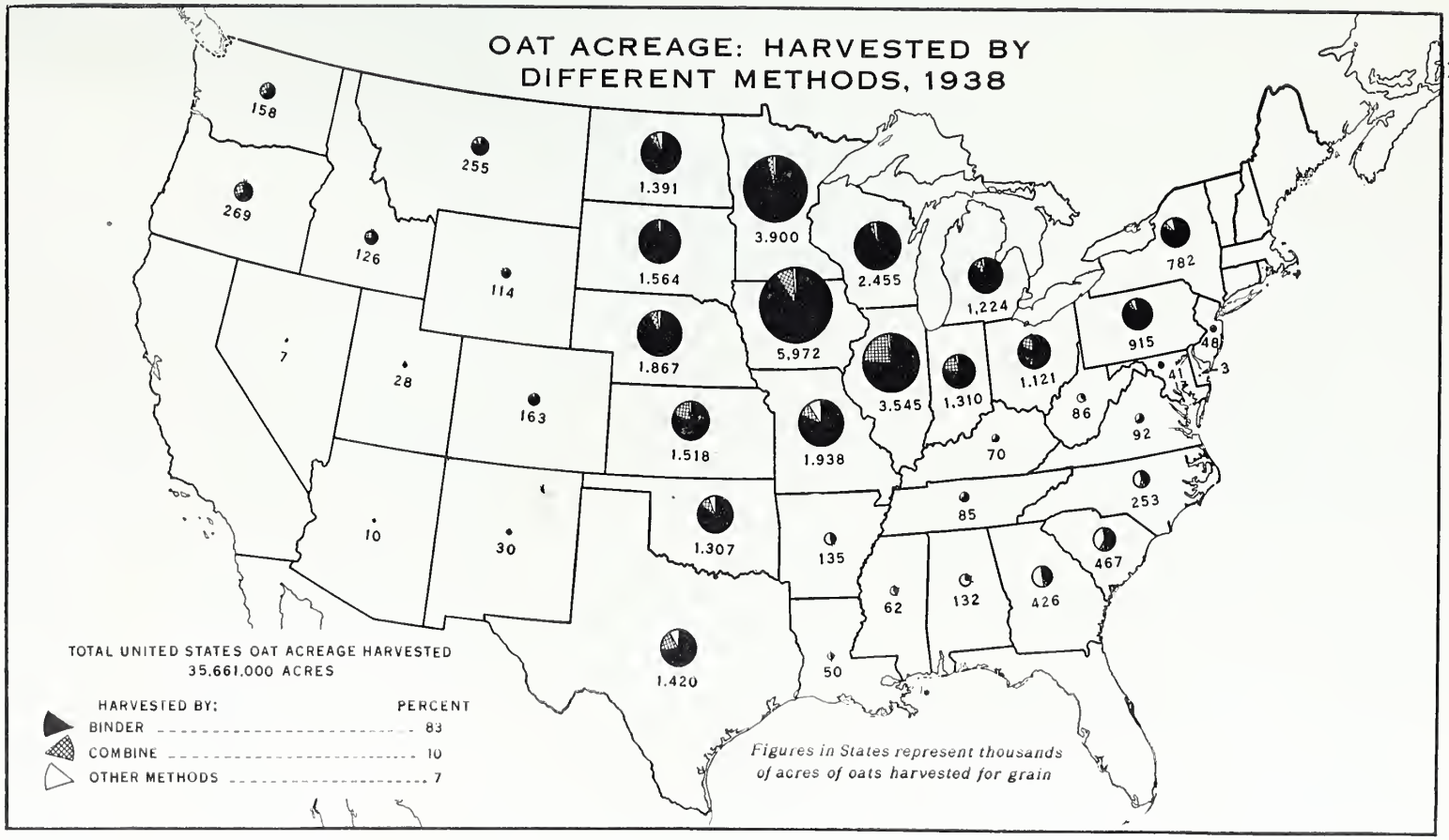


FIGURE 39.—The grain binder was used for harvesting 83 percent of the acreage of oats harvested in the 40 States surveyed in 1938. Ten percent of the acreage was harvested with the combined harvester-thresher, and 7 percent was cradled, cut with mowers, or otherwise harvested. The binder method prevailed in almost all areas, but combines were used to an appreciable extent in the Pacific Northwest, the southern Great Plains, and in the central Corn Belt. The use of the cradle and mower for harvesting oats was more pronounced in the southeastern States than in other areas.. California, Florida, and the New England States were not included in the study, but these eight States together had only 1 percent of the 1938 acreage of oats. Usually from 1.0 to 1.5 hours of labor per acre are used for harvesting oats with the combine and from 5 to 8 hours with the binder-thresher.

CORN AND THE SORGHUMS

Corn is the great American crop, providing about as much feed for farm animals as all the other crops combined. And farm animals consume the product from about 70 percent of the cropland of the Nation and from all the pasture land. Only a very small part of the corn crop is used directly for human food. The grain sorghums are the major feed grains in the western part of Texas, Oklahoma, Kansas, and Nebraska, and in eastern Colorado where hot summer winds and droughts make corn production hazardous. The average area in corn, 1928–37, including that cut for silage and forage, totaled about 100,000,000 acres, and the grain sorghum acreage harvested for grain averaged about 4,000,000 annually for the same period.

More than half of the world's corn crop is grown in the United States, nearly all east of the 100° of west longitude and south of 46° north latitude. In this corn area the summer rainfall is 8 inches or more and the mean summer temperature is 66° or more. More than half of this country's corn is produced in the Corn Belt where corn production exceeds 5,000 bushels per square mile in Iowa and Illinois, and in some counties rises to 12,000 bushels. This is mostly a glaciated region, much of which is characterized by a soil that is high in humus and nitrogen. The land is level to rolling, nearly all arable, and adapted to the use of modern machinery. In addition, the winters are dry and cold, retarding soil leaching, and the summers are wet and warm, promoting rapid plant growth. Corn is a productive crop, yielding in many areas about twice as many pounds of grain per acre as do wheat, oats, barley, or rye. It is probable that the Corn Belt produces more grain per unit of area than any other area of equal size in the world.

This high productivity of corn permits the application of more labor per acre than is used on small grain. The corn land is practically all plowed before planting, it must be cultivated, and most of the acreage is still harvested by hand. In the central agricultural territory the corn crop probably requires more labor than all other crops combined.

However, this need for labor fits in fairly well with labor requirements of the small-grain and hay crops. The small grains do not need much labor in the spring and early summer until harvest, whereas corn land needs to be plowed and harrowed, then the corn is planted, and later the plants are cultivated. Often these repeated cultivations are not completed before the winter wheat and especially the winter barley needs to be harvested. There is some conflict in labor needs at this time. With the harvesting of spring-sown oats there is little overlapping in labor requirements. Then the corn requires no attention until it is harvested for silage or cut and shocked. In the southern part of the central agricultural area winter wheat can be seeded on the corn land. But in most of the Corn Belt the oat crop is seeded the following spring.

There is generally more conflict for labor between the corn crop and the hay crops than between the corn crop and the small-grain crops. The first cutting of clover and of alfalfa may come when the corn needs cultivating, but the second cutting of clover comes after corn is laid by. However, the third cutting of alfalfa may conflict with cutting corn for silage.

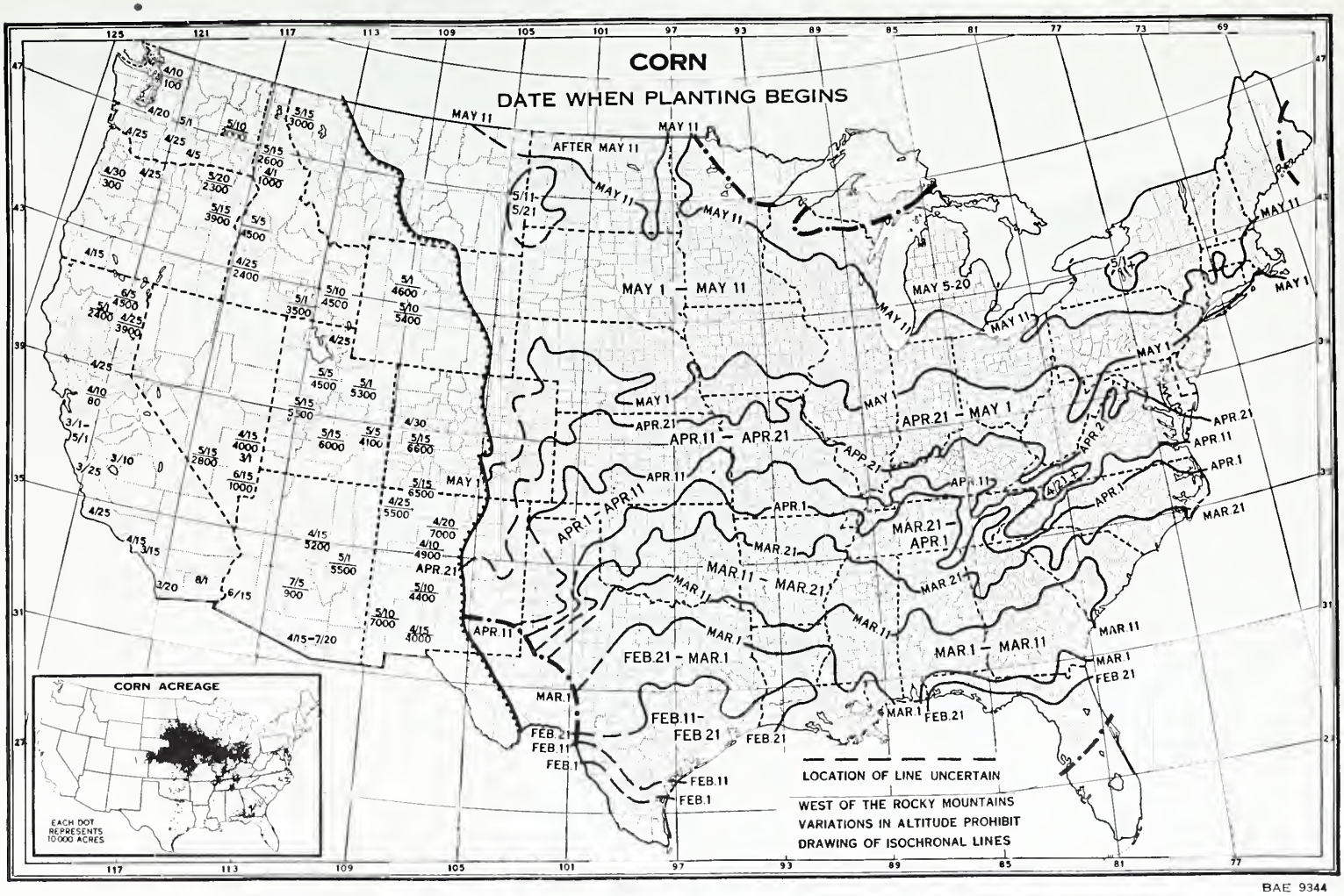


FIGURE 40.—Corn planting begins usually before February 1 in extreme southern Texas and progresses northward at an average rate of 13 miles a Day. In the Corn Belt and in southern Wisconsin, Minnesota, and South Dakota corn planting begins about May 1 and is general by May 15. In the eastern Corn Belt from 10 to 15 hours of man labor and from 25 to 35 hours of horse work are used for preparing land and for planting and cultivating an acre of corn. With tractor-power, man labor is reduced about 50 percent, and an hour of tractor work displaces from 5 to 6 hours of horse work. More labor is used before the harvest in the Northeastern and the Southern States than in the eastern Corn Belt.

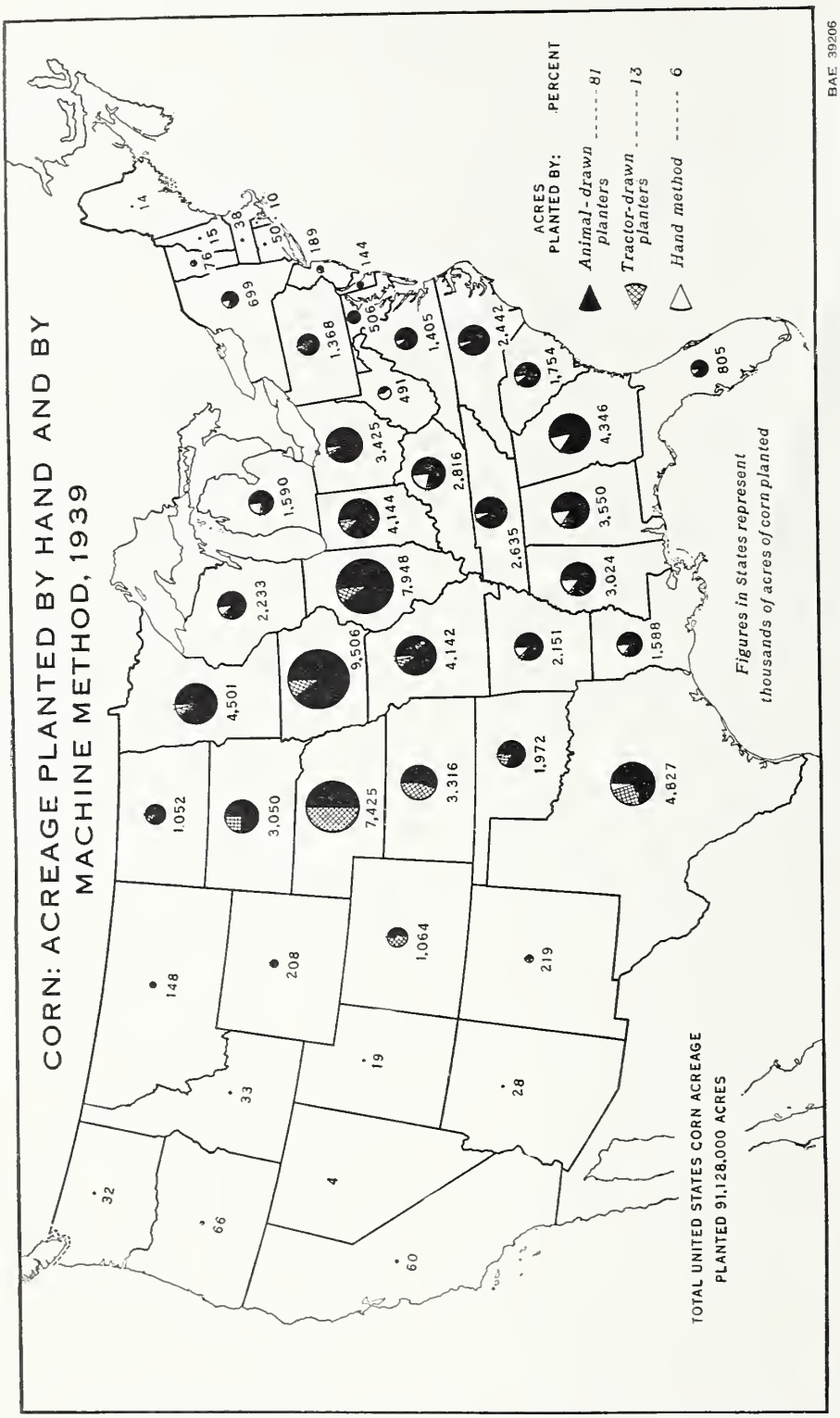

CORN: ACREAGE PLANTED BY HAND AND BY MACHINE METHOD, 1939
ACRES PLANTED BY: PERCENT
Animal-drawn planters ------ 81
Tractor-drawn planters ------ 13
Hand method ------ 6
Figures in States represent thousands of acres of corn planted
TOTAL UNITED STATES CORN ACREAGE PLANTED 91,128,000 ACRES
BAE 39206

FIGURE 41.—More than 80 percent of the corn acreage of the United States was planted with animal-drawn planters in 1939. Tractor-drawn planters were used on 13 percent of the acreage, principally in the Great Plains and the western Corn Belt. Hand methods were used for planting 6 percent of the acreage. This method was relatively important in the Cotton Belt east of Oklahoma and Texas, in some East Central areas, and in the northern areas of the North Central States. Planting corn is a light-duty job and a two-row planter drawn by either two work animals or a tractor usually plants from 15 to 20 acres in a 10-hour day. With a hand planter from 2 to 3 acres are usually planted by one man in a 10-hour day.

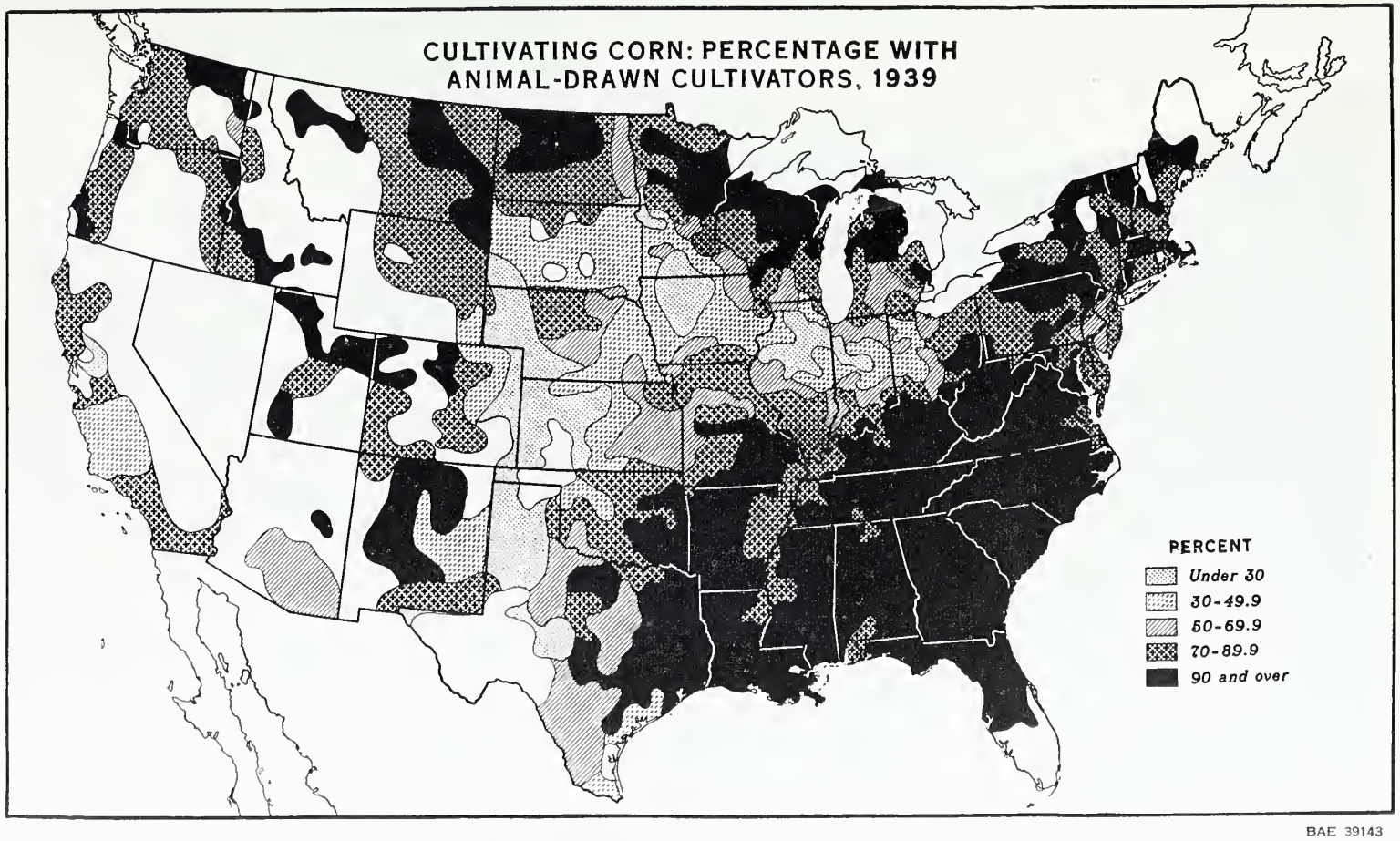
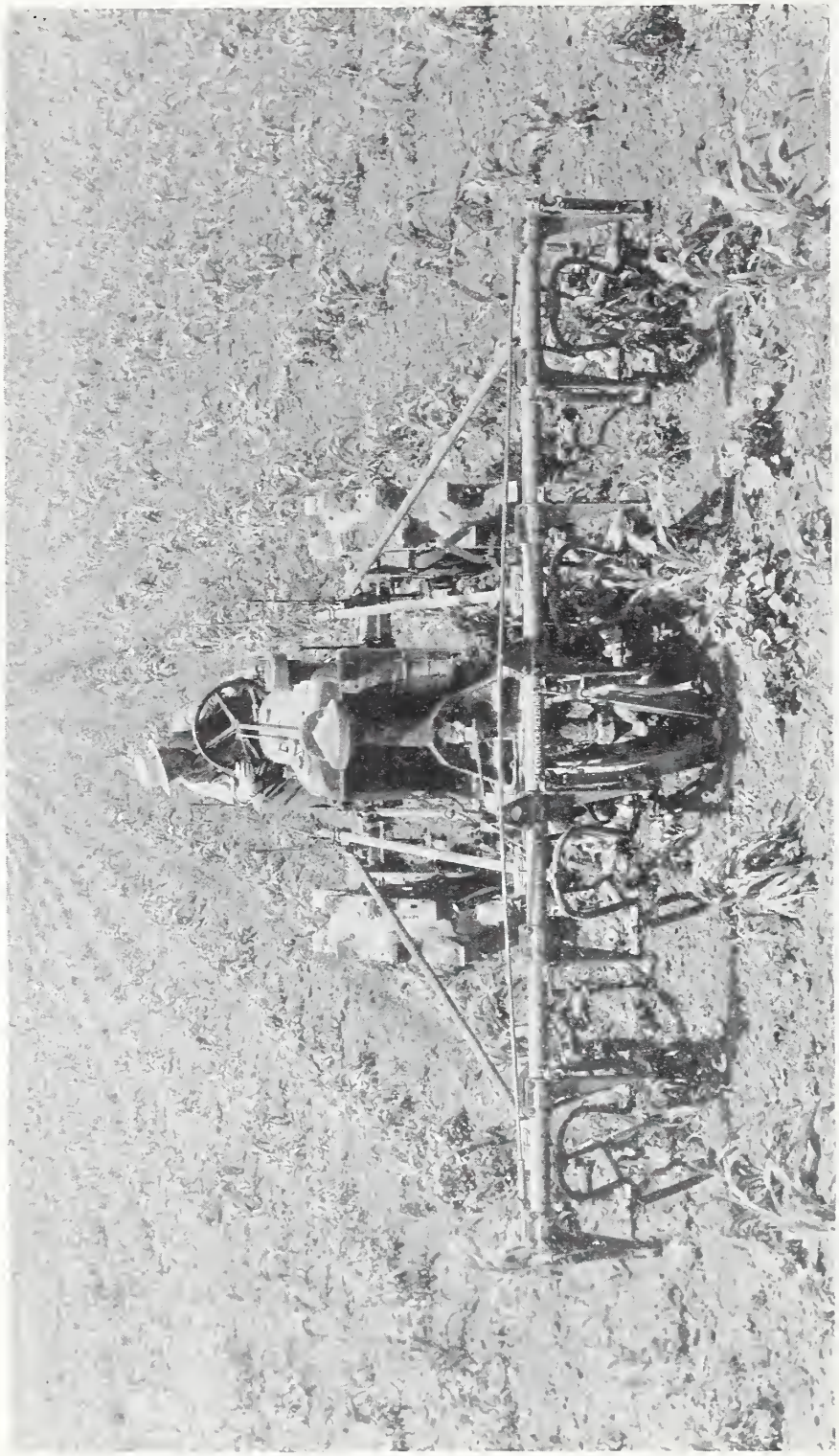


FIGURE 42.—Approximately 91 million acres of land were planted to corn in 1939. The crop is usually cultivated from three to five times. Animal-drawn cultivators were predominant in all areas except in the central Great Plains and in the central Corn Belt. Since, with increases in general-purpose tractors, the use of tractor power for cultivating has been increasing, and in 1939 about 30 percent of corn cultivating was done with tractor power. Cultivating corn is relatively light work. A minimum day's work with a two-row animal-drawn cultivator is about 12 acres, and with a two-row tractor-drawn cultivator about 18 acres.



BAE 37797

FIGURE 43.—Tractor-drawn cultivators were little used before 1925. Their use has expanded rapidly with the increased use of general-purpose tractors. Tractor cultivators are used all over the country but are more often found on relatively large farms within the Corn Belt and the Great Plains. Tractor cultivators are usually of two-row, three-row, and four-row size; with the two-row cultivators the most common. Under favorable conditions, about 35 acres can be cultivated in a day with a four-row tractor-drawn cultivator.

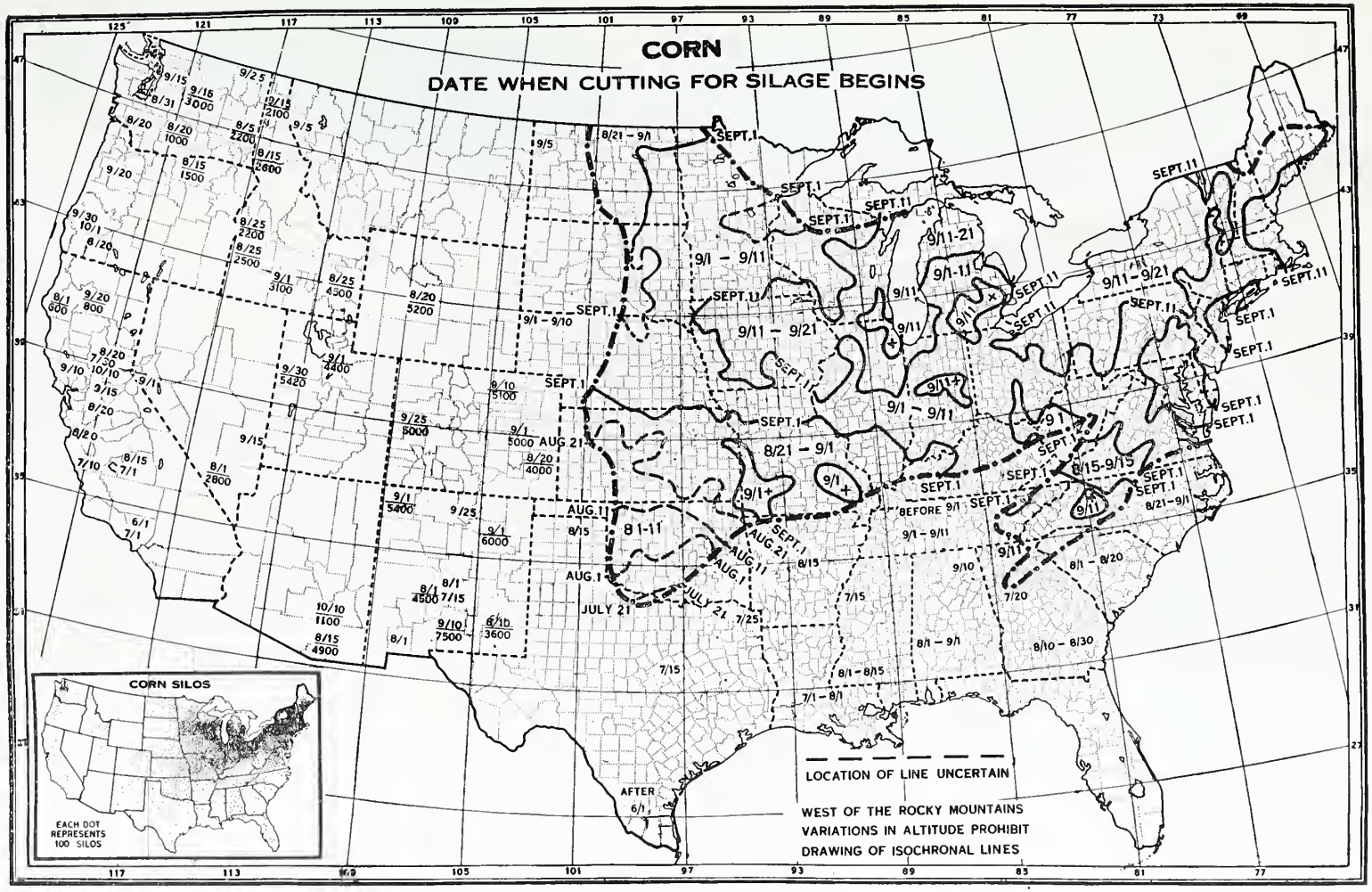

CORN
DATE WHEN CUTTING FOR SILAGE BEGINS
CORN SILOS
EACH DOT REPRESENTS 100 SILOS
LOCATION OF LINE UNCERTAIN
WEST OF THE ROCKY MOUNTAINS VARIATIONS IN ALTITUDE PROHIBIT DRAWING OF ISOCHRONAL LINES
BAE 12076

FIGURE 44.—The first silo in the United States was built about 1875 and they are now concentrated in the northern and northeastern dairy States. In many parts of these States the season is too short to produce corn for grain. In Kansas, Missouri, and Virginia cutting for silage usually takes place during August. Throughout the dairy and northern Corn Belt States the cutting occurs in September. This operation requires the labor of several men, and it is often difficult to obtain sufficient help.

About 15 hours each of man labor and horse work and 1.25 hours of tractor work are commonly used to harvest an acre of corn for silage. These figures apply where corn is cut with a row-binder drawn by three horses, where stationary ensilage cutters are used, and where the yield is about 8 tons of silage per acre.

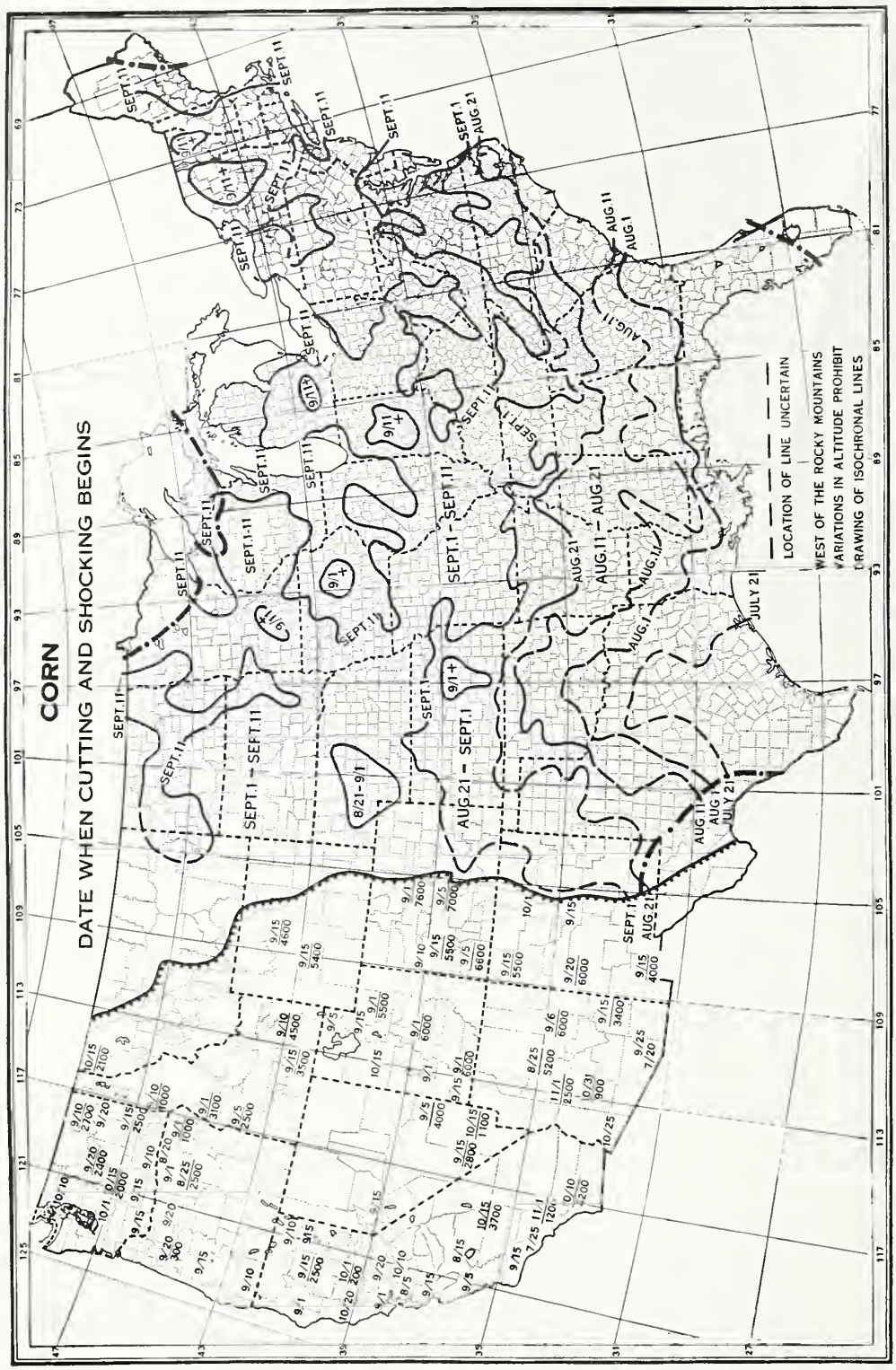

CORN
DATE WHEN CUTTING AND SHOCKING BEGINS
SEPT. 11
SEPT. 1 – SEPT. 11
AUG. 21 – SEPT. 1
8/21 – 9/1
AUG. 11 – AUG. 21
AUG. 1 – AUG. 11
JULY 21
LOCATION OF LINE UNCERTAIN
WEST OF THE ROCKY MOUNTAINS VARIATIONS IN ALTITUDE PROHIBIT DRAWING OF ISOCHRONAL LINES
BAE 11430

FIGURE 45.—The cutting and shocking of corn is the common practice in the dairy States of the North and in Ohio, and West Virginia; in most of Kentucky, Virginia, and Maryland; and in the eastern Ozark area of Missouri. Cutting begins throughout these areas during early September and is general during the last 10 days of that month. For a corn yield of 35 bushels per acre about 25 hours of man labor and about one-half this amount of horse work are commonly used per acre to cut, shock, and husk by hand, crib the corn, and stack the fodder.

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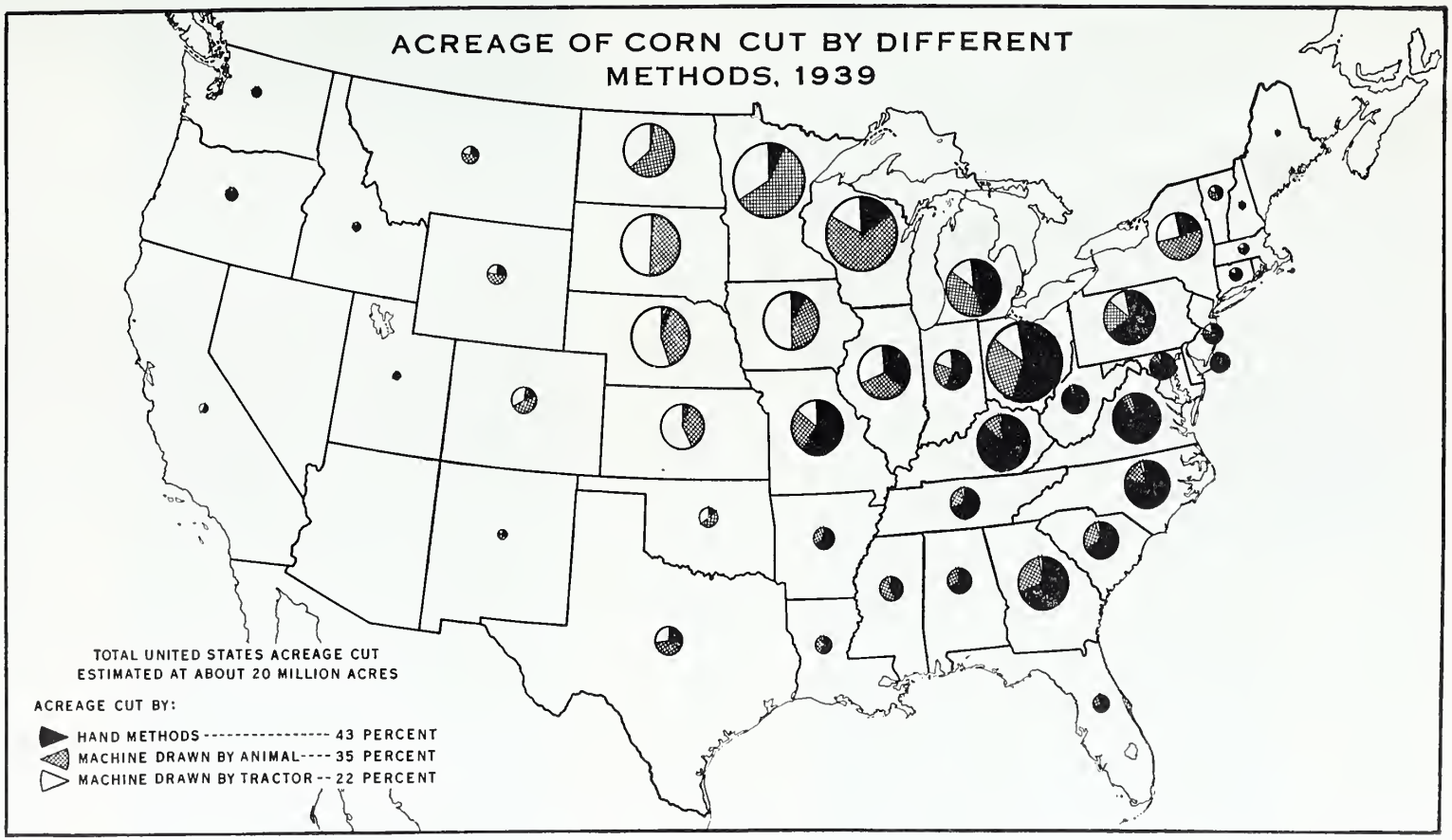

ACREAGE OF CORN CUT BY DIFFERENT METHODS, 1939
TOTAL UNITED STATES ACREAGE CUT ESTIMATED AT ABOUT 20 MILLION ACRES
ACREAGE CUT BY:
HAND METHODS ---------- 43 PERCENT
MACHINE DRAWN BY ANIMAL---- 35 PERCENT
MACHINE DRAWN BY TRACTOR -- 22 PERCENT
BAE 39153

FIGURE 46.—More than 88 million acres of corn were harvested for all purposes in 1939. The stalk roughage was saved for silage, fodder, or stover from about 20 million acres of corn. For the entire country, about 43 percent of the acreage cut was by hand methods, 35 percent with animal-drawn binders or other cutting devices, and 22 percent with tractor-drawn machines. Handcutting was pronounced in the South, the East Central States, and along the Atlantic seaboard. Machine methods were pronounced in the Great Plains, the western Corn Belt, and in some of the northern dairy States. With a one-row binder, one man and a two- or three-horse team, about 6 acres are cut in a 10-hour day. One man will shock about 3 acres in a 10-hour day. Cutting and shocking an acre by hand methods is about an average day's work for a man.

BAE FM 13845

FIGURE 47.—Cutting corn by hand methods is a practice in all producing areas. This method of saving corn roughage generally prevails in the Atlantic Coast States and in the States north of the Cotton Belt and east of Kansas. The method is especially suitable when the corn acreage to be cut is small; then in some years of storm damage, machine methods of cutting corn cannot be followed because of "down" corn.

BAE 37763

FIGURE 48.—Row binders and other cutting devices drawn by work-animal power were used on more than one-third of the corn acreage cut in this country in 1939. Use of animal power for cutting corn was most pronounced in the east North Central, the west South Central and the Rocky Mountain States, but its use was reported in every State. A crew of three men and two to three work animals usually cuts and shocks about 6 acres of corn in a day with a one-row binder, while cutting and shocking 8 to 9 acres is a day's work for a crew of 4 men, a tractor, and a one-row binder.

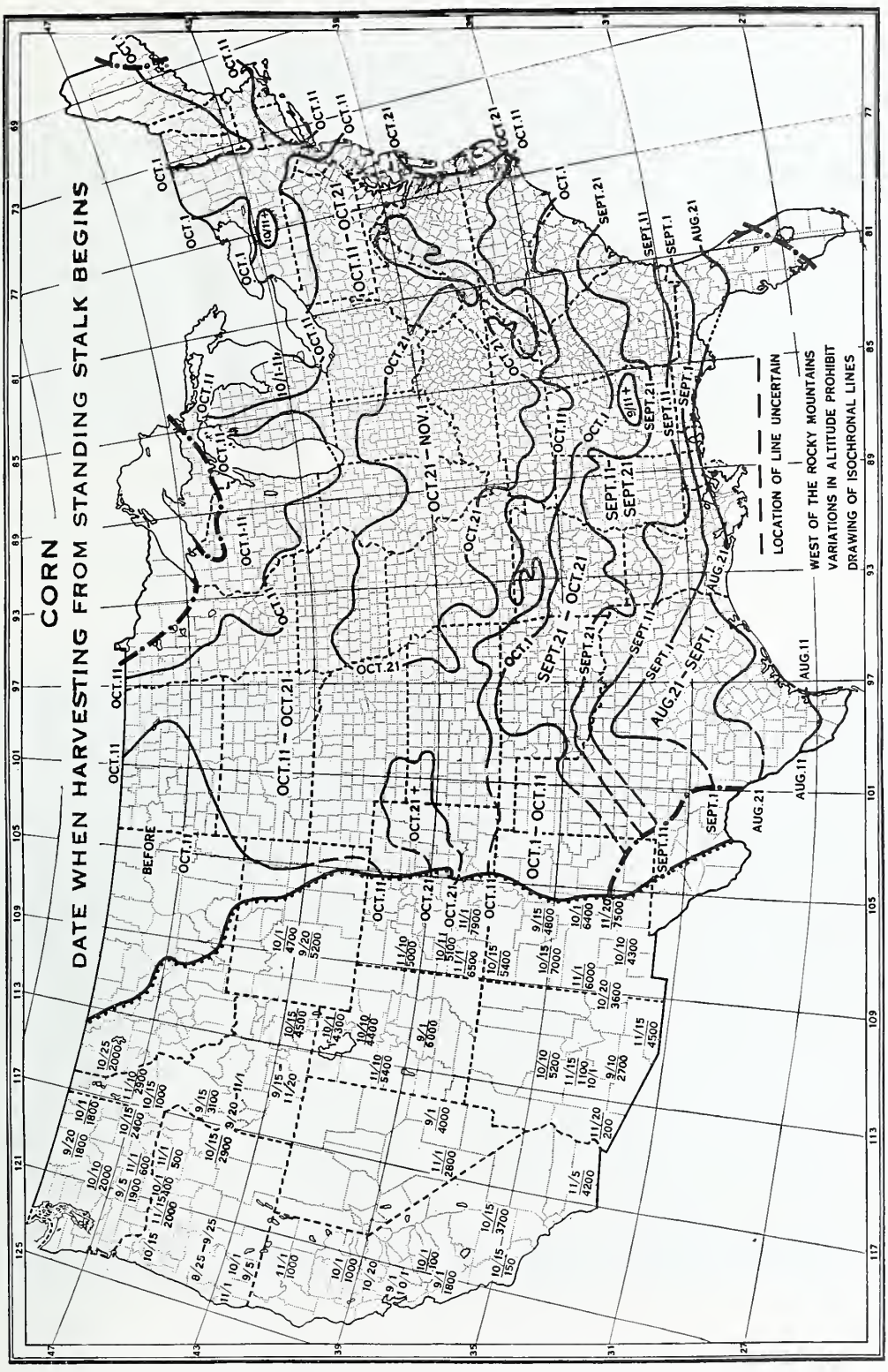

CORN
DATE WHEN HARVESTING FROM STANDING STALK BEGINS
LOCATION OF LINE UNCERTAIN
WEST OF THE ROCKY MOUNTAINS VARIATIONS IN ALTITUDE PROHIBIT DRAWING OF ISOCHRONAL LINES
BAE 11432

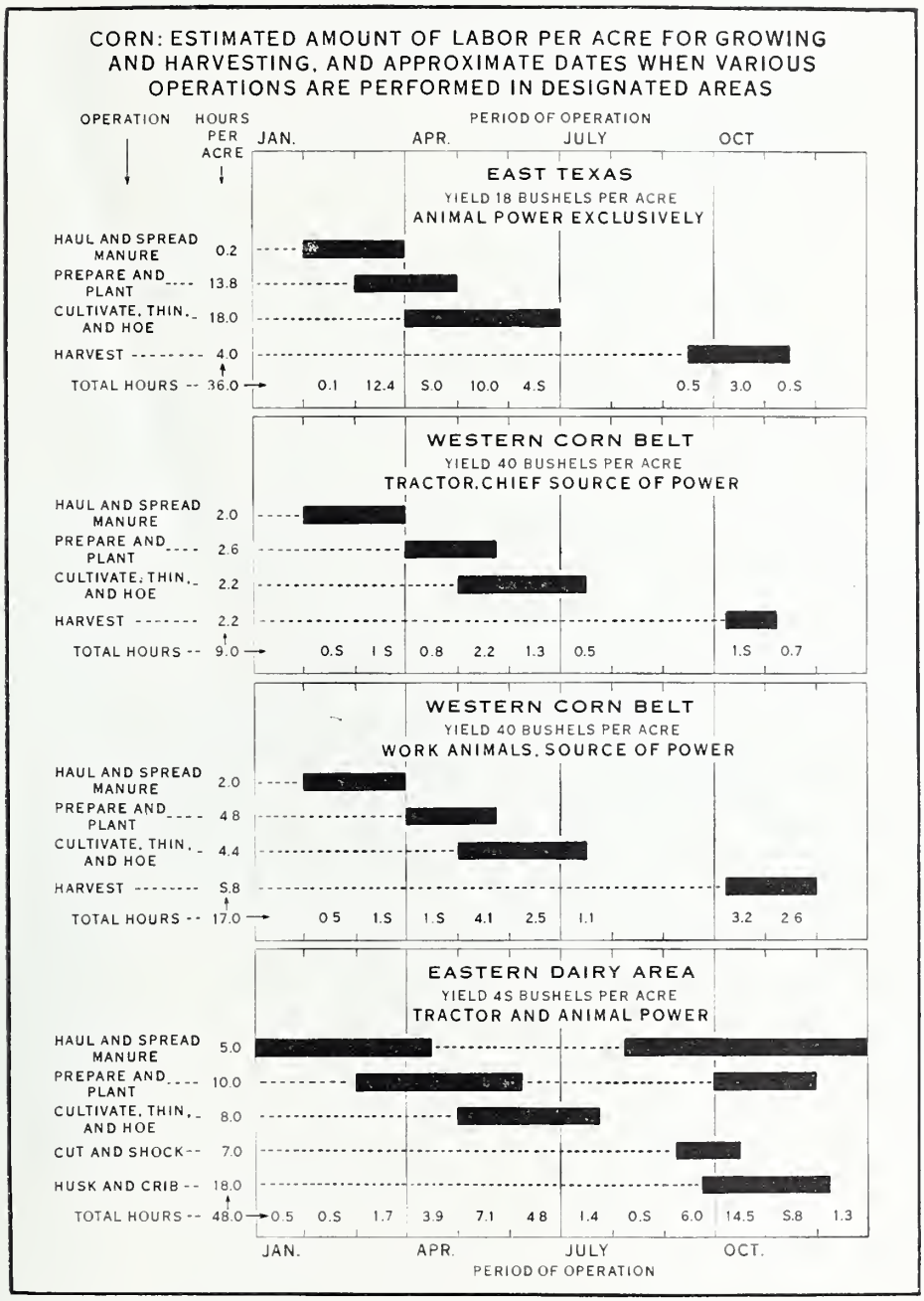
FIGURE 49.—Harvesting corn from the standing stalk begins in the Southern States during September (in central Texas and Florida during August) and becomes general during October. In the heart of the Corn Belt husking from the standing stalk begins during the latter part of October and continues into December. The stalks may be plowed under later or in the spring. Little transient seasonal labor is employed in the culture of corn.

BPI CI 4229

FIGURE 50.—Husking corn from the standing stalk is a common practice. In the Southern States corn is harvested by pulling or snapping instead of by husking. Where corn is gathered from the standing stalk, hand methods prevail, except in the central Corn Belt, where field pickers are used. In the Corn Belt, it usually takes around 7 hours to husk and crib an acre of corn yielding about 45 bushels. In the South, from 4 to 5 hours of labor are usually needed for pulling and cribbing an acre of corn yielding about 15 bushels.

BAE 37785

FIGURE 51.—Almost half of the acreage of corn harvested for grain in intensive corn-producing areas was harvested by mechanical pickers in 1938, and their use is increasing. With a two-row picker it usually takes from 2 to 3 hours of labor to husk and crib an acre of corn in the Corn Belt. From 6 to 8 hours of labor are needed to husk and crib an acre by hand methods.


CORN: ESTIMATED AMOUNT OF LABOR PER ACRE FOR GROWING AND HARVESTING, AND APPROXIMATE DATES WHEN VARIOUS OPERATIONS ARE PERFORMED IN DESIGNATED AREAS
OPERATION
HOURS PER ACRE
PERIOD OF OPERATION
JAN.
APR.
JULY
OCT
EAST TEXAS
YIELD 18 BUSHELS PER ACRE
ANIMAL POWER EXCLUSIVELY
HAUL AND SPREAD MANURE 0.2
PREPARE AND PLANT 13.8
CULTIVATE, THIN., AND HOE 18.0
HARVEST 4.0
TOTAL HOURS 36.0
0.1 12.4 5.0 10.0 4.5 0.5 3.0 0.5
WESTERN CORN BELT
YIELD 40 BUSHELS PER ACRE
TRACTOR, CHIEF SOURCE OF POWER
HAUL AND SPREAD MANURE 2.0
PREPARE AND PLANT 2.6
CULTIVATE, THIN., AND HOE 2.2
HARVEST 2.2
TOTAL HOURS 9.0
0.5 1.5 0.8 2.2 1.3 0.5 1.5 0.7
WESTERN CORN BELT
YIELD 40 BUSHELS PER ACRE
WORK ANIMALS, SOURCE OF POWER
HAUL AND SPREAD MANURE 2.0
PREPARE AND PLANT 4.8
CULTIVATE, THIN., AND HOE 4.4
HARVEST 5.8
TOTAL HOURS 17.0
0.5 1.5 1.5 4.1 2.5 1.1 3.2 2.6
EASTERN DAIRY AREA
YIELD 45 BUSHELS PER ACRE
TRACTOR AND ANIMAL POWER
HAUL AND SPREAD MANURE 5.0
PREPARE AND PLANT 10.0
CULTIVATE, THIN., AND HOE 8.0
CUT AND SHOCK 7.0
HUSK AND CRIB 18.0
TOTAL HOURS 48.0
0.5 0.5 1.7 3.9 7.1 4.8 1.4 0.5 6.0 14.5 5.8 1.3
JAN.
APR.
JULY
OCT.
PERIOD OF OPERATION

BAE 39326

FIGURE 52.—Size of machinery used, harvest method, and the per acre yield of corn affect the quantity of labor used for growing and harvesting an acre of corn. Relatively little labor is used in the western Corn Belt when tractor power is used and when the crop is gathered with a mechanical two-row corn picker. In the same area when animal power is used and the crop is gathered by hand husking, almost double the quantity of labor is used as on the tractor-picker farm. In most southern sections corn is harvested mainly from the standing stalk. Chiefly because of the small implements used it takes almost twice as much labor to grow and harvest an acre of corn as is used on Corn Belt farms with animal power. In the eastern dairy area the corn is largely cut and shocked and the grain husked from the shock. There the machines and the fields are smaller and the fields less level than in the Corn Belt. In this area more labor is needed for producing and harvesting an acre of corn than in the other areas.

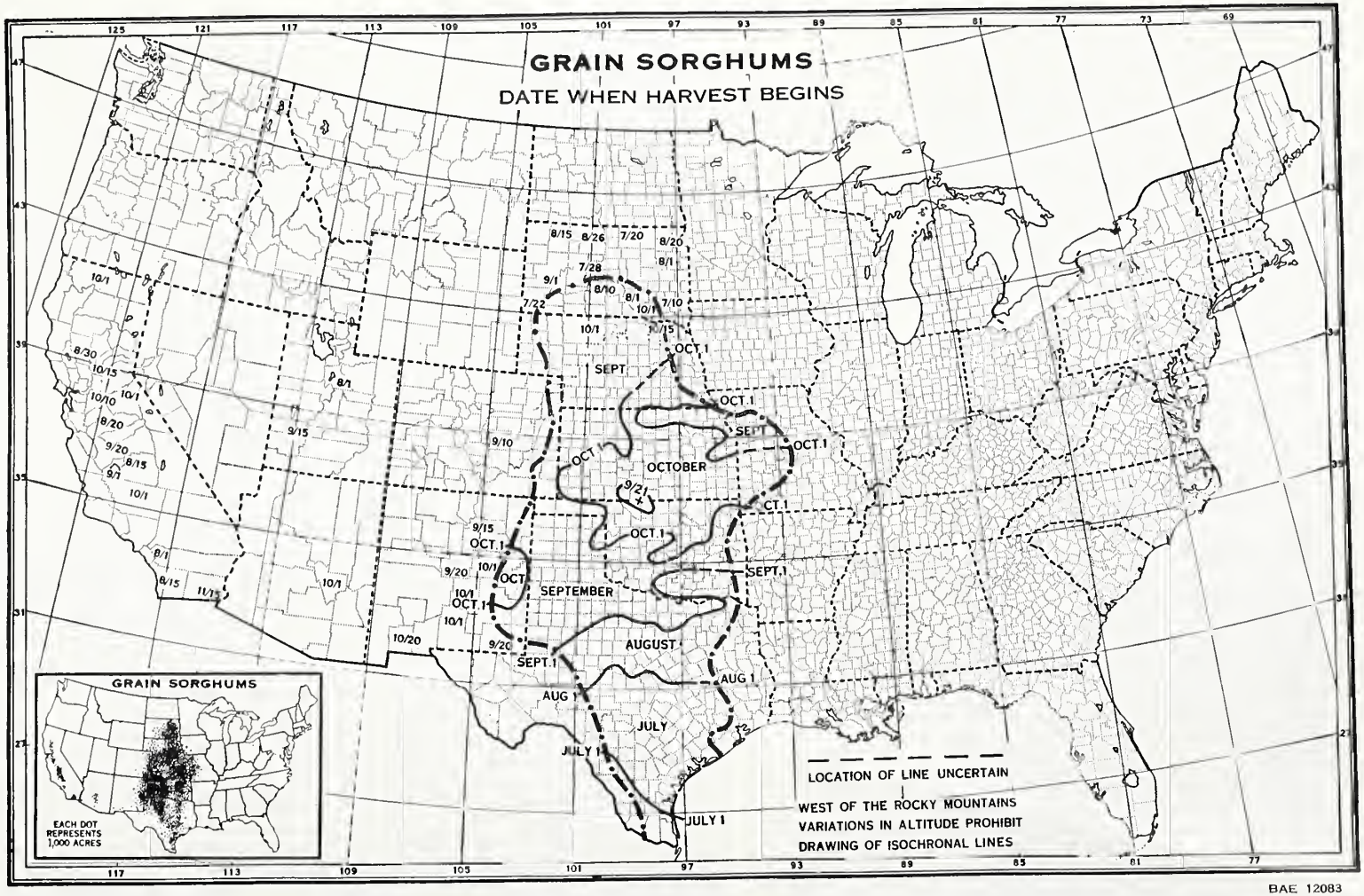


FIGURE 53.—The grain sorghums are grown mostly in the Great Plains region owing to their drought-resisting character. The long growing season in the Southern Plains and the vicissitudes of rainfall over much of the region not only permit but enforce wide latitude in dates for planting and harvesting. Hence it has been possible to draw lines on the map only by 30-day periods rather than by 10-day periods. Where grain sorghums are harvested with a row-binder and fed in the bundle, about 4 hours each of man labor and horse work, or their tractor equivalent, are commonly used for cutting and shocking an acre yielding 20 bushels. When the crop is harvested for grain by the combine method, the labor required is only half as much.

HAY CROPS

Hay is grown in practically all parts of the country, mainly because many plants with varying climatic requirements are made into hay. Although hay is grown everywhere, it is relatively an unimportant crop in the Cotton Belt and in the Southwest, except in the irrigated districts. Most of the crop is produced in the Hay and Dairy Belt, in the Corn Belt and in the Corn and Winter Wheat Belt. But in the last decade production of hay has been expanding noticeably in the Cotton Belt. Timothy and clover, and more recently alfalfa, are the dominant hay crops in these regions. Hay, mostly alfalfa, is very important in the irrigated districts of the West, and a considerable quantity is grown in the Spring Wheat Belt.

Practically all the hay is consumed by farm animals. In 1929 it was estimated that dairy cattle consumed 45 percent of the hay in the United States; beef cattle 22 percent; horses and mules 30 percent, and sheep and goats 3 percent. The proportion consumed by horses and mules is smaller today.

The area of crops cut for hay totaled about 70,000,000 acres in 1939, practically the same as in 1929. Of this acreage, the legume hays totaled about 50 percent, as compared with 44 percent in 1929. Growing hay and maintaining pasture constitute the most effective means of controlling soil erosion. As the erosion losses become more evident and as cattle increase in relative importance, as seems probable when knowledge of the high food values of milk and meat become more general and the purchasing power of the poor increases, it is reasonable to expect that hay will increase in relative importance. Nevertheless, the 1940 Census revealed a decline since 1930 in the total acreage of hay. Decreases, sometimes small, took place in the acreage of hay in all Northern States except Connecticut and Wisconsin and in all the Western States except Washington, Nevada, Arizona, and New Mexico. In the Southern States on the other hand, a significant increase occurred, associated doubtless with the decreased acreage of cotton. In many of the Southern States the acreage of hay practically doubled during the decade.

Most of the hay crops do not require annual seeding, hence they do not require as much labor as many crops that must be planted annually. Nevertheless, when three-fourths of the cropland is in hay, as in much of New England, haymaking involves a heavy demand for labor, which is often difficult to supply. Likewise, in many irrigated areas in the far Western States, the acreage of hay exceeds that of all other crops, resulting in an irregular seasonal distribution of crop labor. Rotation of crops is of great value, for it helps to conserve soil fertility, particularly when legumes are grown, and likewise tends to reduce losses from plant diseases and to equalize the seasonal needs for labor.

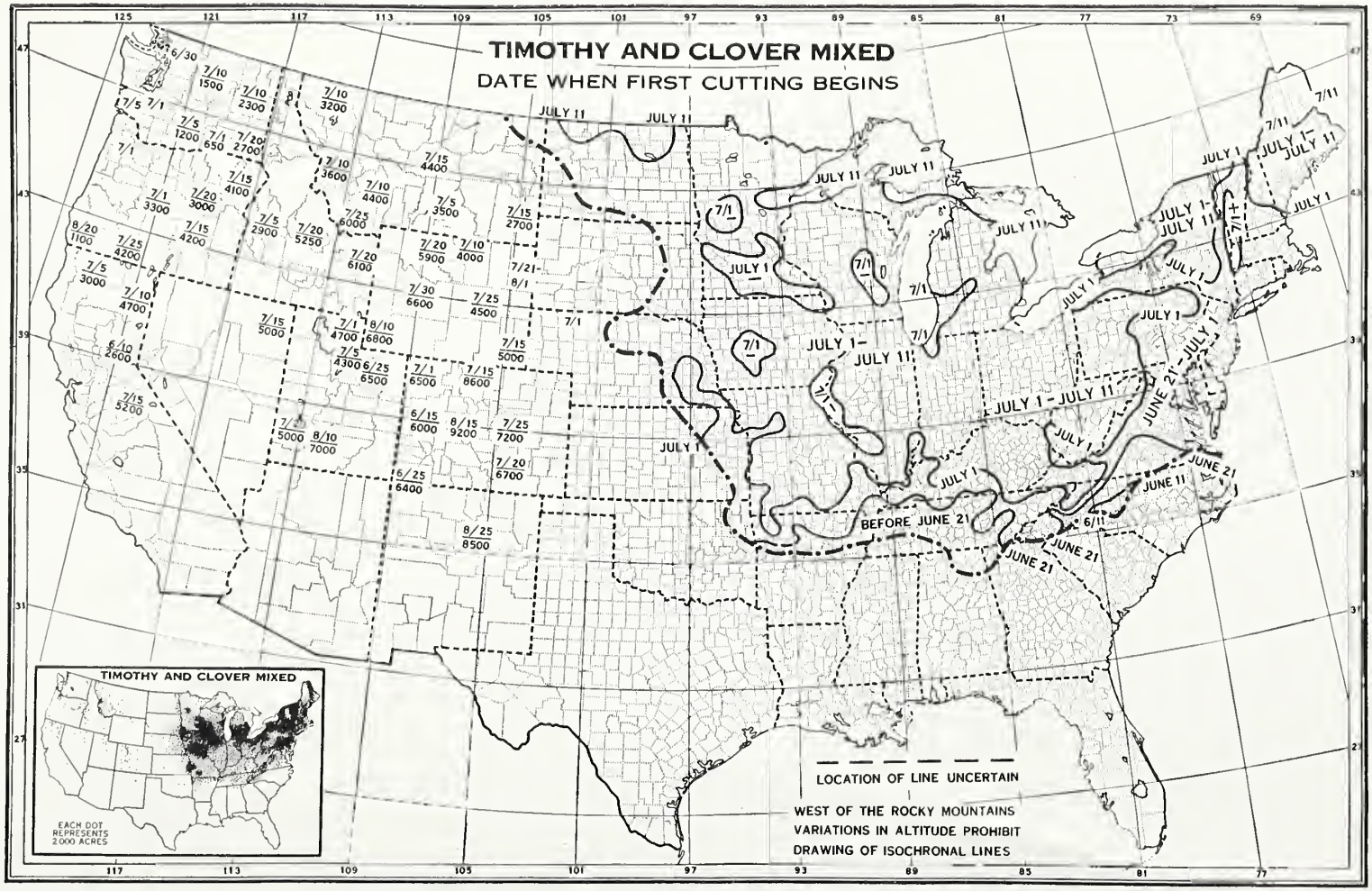


FIGURE 54.—Clover, sown separately or mixed with timothy, is the principal hay crop in the Corn Belt, the Dairy Belt, and Pacific Northwest region, In the hill lands of New England and New York, and in northern Wisconsin, hay constitutes more than one-half the acreage of all crops, and haymaking time becomes the busiest period of the year. In the Corn Belt, the cutting of clover hay frequently occurs at the same time as the last cultivation of corn. Throughout the region of greatest production the cutting of timothy and mixed hay begins usually about July 1. When teams are used for mowing, raking, and hauling from the field, from 6 to 8 hours each of man labor and horse work are commonly used for harvesting an acre of hay yielding from 1 to 1.5 tons per acre.

EXT S 21599 C

FIGURE 55.—Most of the hay is cut with animal-drawn mowers. A man and a two-horse team with a 5-foot mower will usually cut from 8 to 10 acres in a 10-hour day.

EXT S 5060

FIGURE 56.—Tractor-mounted mowers have come into fairly extensive use in some areas, especially on farms with large acreages of hay crops. Most of the hay acreage is cut in the summer months when care must be exercised to avoid the overheating of farm animals. This and the lack of animal power on many farms are the chief reasons for the increased use of tractor power for operating mowers. Tractor-mounted mowers usually cut a wider swath and are operated at higher speeds than animal-drawn mowers. With tractor power, mower performance is usually about 50 percent greater than for animal-drawn mowers of the same size.

BAE 30847

FIGURE 57.—Raking hay is light work and is usually done with animal power. The side-delivery rake is used to some extent throughout the country, but its use is most pronounced in the Corn Belt, in the Northeastern States, and in the irrigated areas. Its use predominates on farms where the hay is moved from the windrow by mechanical methods, such as hay loaders and windrow pick-up balers. Raking from 2.0 to 2.5 acres per hour is about a normal achievement with a 10-foot side-delivery rake.

BAE 30654

FIGURE 58.—Hay loaders are used principally in the Corn Belt and Northeastern States. When a hay loader is used for loading, and hay forks or slings are used for unloading, a crew of two men, one boy, and two horses can usually load, haul, and store about 10 tons of hay in 10 hours. When the hay is loaded and unloaded by hand the same crew could handle only about 5 tons in 10 hours.

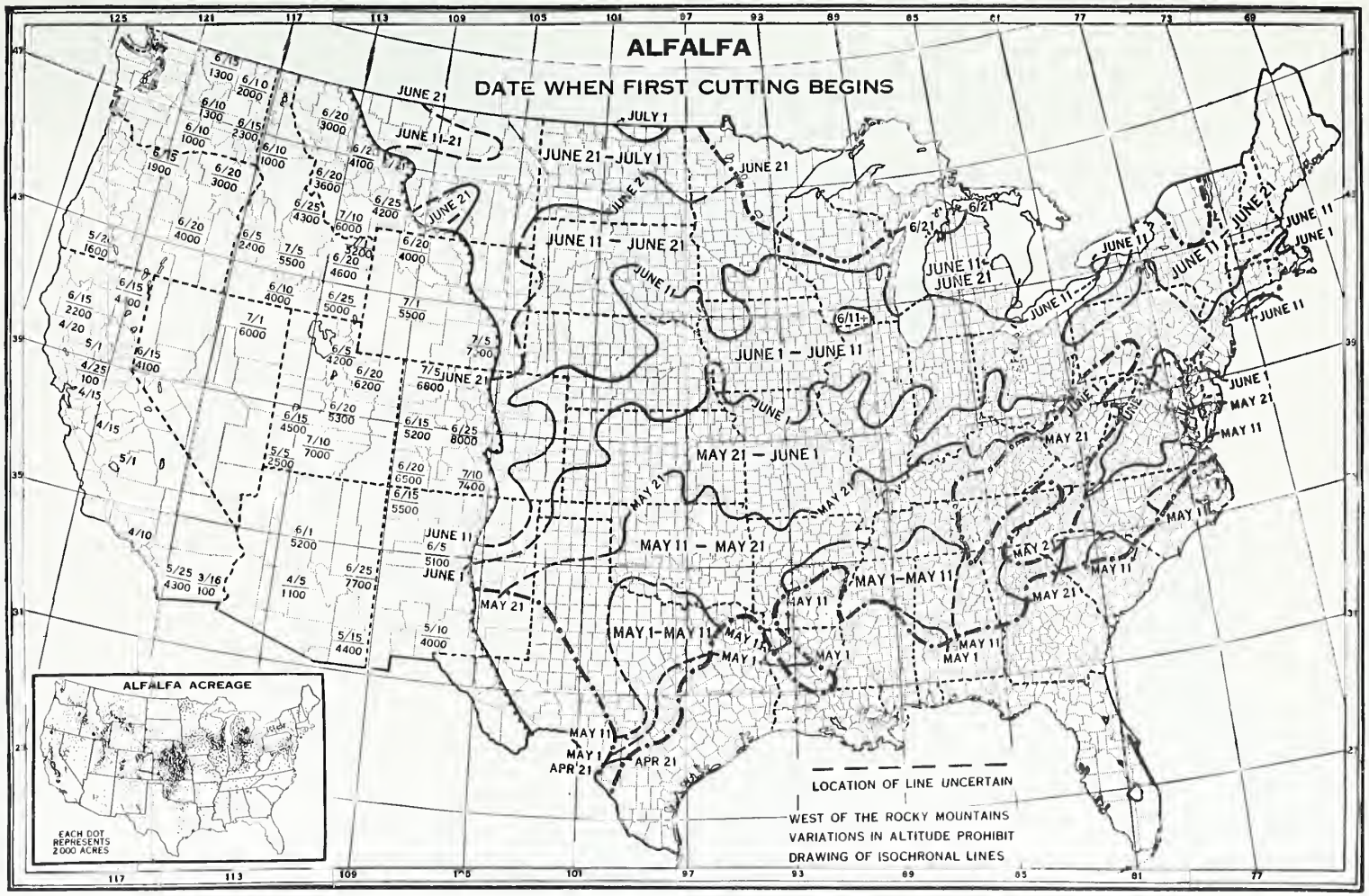
EXT S 21535 C

FIGURE 59.—In the North Central and Northeastern States most of the hay is stored in barns as loose hay. The use of forks or slings operated with animal or mechanical power saves much labor as compared with storing by hand methods. With barns of this type, storing by hand methods is not feasible, but hand methods for storing are still followed on many small farms.

BAE 17501

FIGURE 60.—Hay stackers are used largely in the western part of the country. When the haymaking crew is properly organized the use of hay stackers saves much time and eliminates much of the hard work. A fairly common stacking crew consists of five men and six horses. The crew includes two men and four horses operating two sweep rakes, one man and two horses operating the stacker, with two men stacking hay. After the hay is windrowed, about 30 tons of hay can be stacked in a 10-hour day with a crew of this size and with a stacker. When stackers are used, only about half the labor required by hand methods is necessary.

FIGURE 61. The windrow pick-up baler is a new development in haymaking. Few balers of this kind were in use in 1930, but now they are used to some extent in practically every State. They are most common in California, Arizona, and the irrigated areas of the Southwest. The windrow pick-up baler is usually tractor-drawn and is equipped with an auxiliary motor. With a four-man crew, 15 to 20 tons of hay are usually baled in a day. After the hay is windrowed about 4 hours of labor is usually needed for baling and storing a ton of hay.


ALFALFA
DATE WHEN FIRST CUTTING BEGINS
JUNE 21
JULY 1
JUNE 11-21
JUNE 21 – JULY 1
JUNE 11 – JUNE 21
JUNE 1 – JUNE 11
MAY 21 – JUNE 1
MAY 11 – MAY 21
MAY 1–MAY 11
APR 21
ALFALFA ACREAGE
EACH DOT REPRESENTS 2 000 ACRES
LOCATION OF LINE UNCERTAIN
WEST OF THE ROCKY MOUNTAINS VARIATIONS IN ALTITUDE PROHIBIT DRAWING OF ISOCHRONAL LINES

BAE 12081

FIGURE 62.—Alfalfa is the leading hay crop in the irrigated valleys of the West, and in the North Central States more and more farmers are making alfalfa their leading hay crop. The fact that the first cutting interferes more with the cultivation of corn than does the cutting of timothy and clover, has retarded the expansion of alfalfa in certain parts of the Corn Belt. In the central Great Plains States the fourth cutting may conflict with the harvesting of corn. In the Corn Belt the first cutting of alfalfa occurs soon after June 1; in eastern Colorado, in the Salt Lake country, and in the Yakima and lower Snake River Valleys about June 10; in the Great Valley of California about April 15, and in the Imperial and Salt River Valleys about April 1.

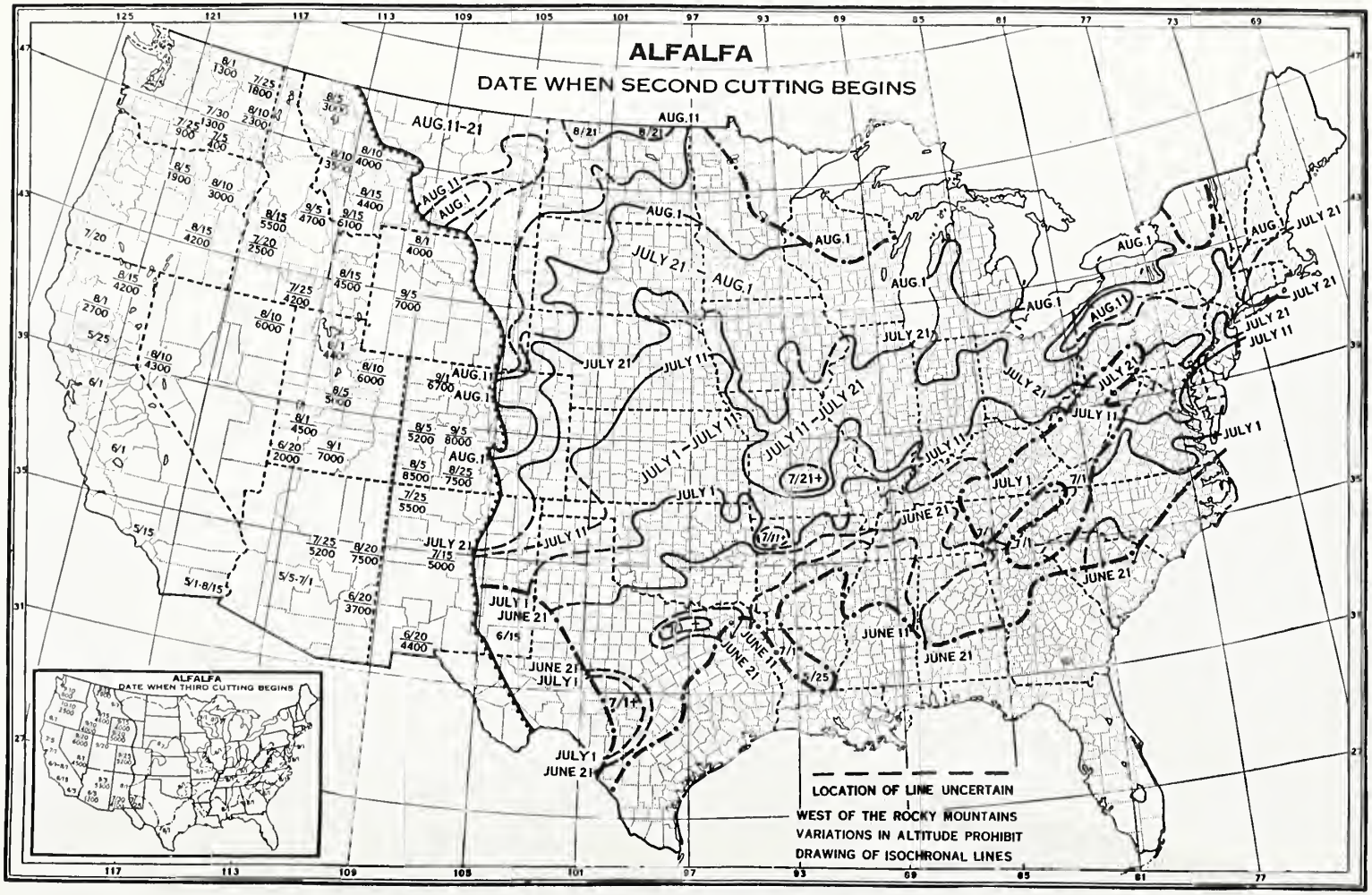


FIGURE 63.—The second cutting of alfalfa may occur in some of the warmer parts of the West within a month after the first cutting, whereas in the cooler parts of the North and East nearly 2 months may elapse. In the western mountain areas for three cuttings of alfalfa, about 12 hours of man labor and 20 hours of horse work are commonly used to cut, rake, and stack an acre of alfalfa if a buck rake and an overshot stacker are used. When sleds, slings, and stackers are used, the labor and power per acre is increased by about 50 percent. In the North Central States, where alfalfa is commonly stored in barns, the labor and power for harvesting two cuttings yielding a total of 2 tons per acre is from 12 to 16 hours each of man labor and horse work.

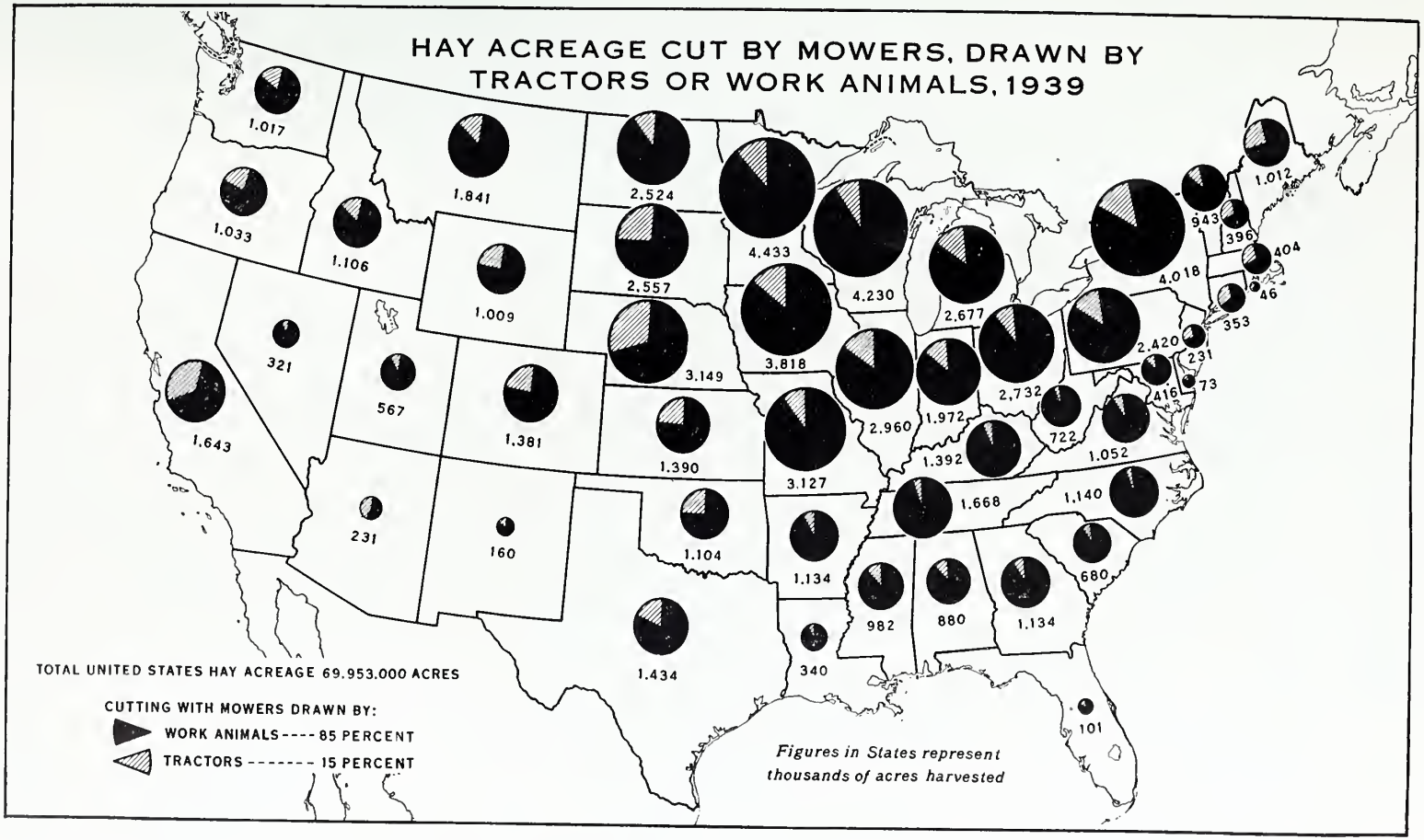


FIGURE 64.—About 70 million acres of tame and wild hay were harvested in 1939. Some hay acreage was cut two or more times, and it is probable that more than 100 million acres were cut the equivalent of one time. For the entire country, 85 percent of the acreage cut in 1939 was cut with mowers drawn by animals and only 15 percent with tractor-drawn mowers. Tractor-drawn mowers were most commonly reported in the Western States and the North Central States. They were used but little in the South Central and eastern cotton States. Tractors displaced fewer work animals in mowing hay than in operations of a heavier type.

COTTON AND TOBACCO

No other nation in the world has combined within its borders a cotton belt, a corn belt, a hay and dairy belt, a wheat belt, a grazing and irrigated-crops belt, a trucking belt, and a fruit belt. Even the entire continent of Europe does not possess such diversity. This diversity is a source of both strength and weakness; it results in an agriculturally independent nation that is interdependent regionally. But it also results in diversity of interests and sometimes in seeming conflict of interests.

Particularly is this true of the Cotton Belt, which is different from the other regions from the standpoint of dependence on foreign markets for disposal in normal years of half its major crop, its system of land tenure in the richest sections, its racial elements, its social stratification, and the level of living of many of its people. Cotton, like most cash crops, appears to favor tenancy or the extensive use of wage labor in agriculture. Associated with the sharecropper system is a credit system that tends to impoverish the debtor and often the creditor too. Even the climate tends toward impoverishment of the land. Soils of the uplands have long been leached of the lime, potash, and other elements of fertility by the heavy rainfall; and now, with the clearing and cultivating of the land this heavy rainfall is causing severe erosion of the soil in many areas. The kinds of crops also tend toward impoverishment. Not only is soil erosion facilitated by these intertilled crops which expose the bare soil to the rains during most of the year, but also the tillage of the soil and the high temperatures promote bacterial decomposition and oxidation of the organic matter, or humus, in the soil, thereby lowering its water-holding capacity and its nitrogen content.

These losses can be repaired by the use of mineral fertilizers and organic manures, leguminous forage crops, pasture grasses, and by more livestock. But fertilizers are expensive, and crops having a high value per acre, like cotton, and tobacco are normally required to repay the cost. In certain small areas, fruits, particularly peaches and strawberries, are grown; in other small areas there are early vegetables which have a high value per acre. Peanuts which have a high value per acre are grown extensively in some States, but as yet no crop has been discovered that has such high value and a sufficiently extensive market to replace much of the cotton. The great agricultural problem of the Cotton Belt is to obtain a sufficient cash income to permit of the purchase of fertilizers and meet other needs for money and at the same time promote conservation of the soil resources.

This problem is not confined to the Cotton Belt, but the situation is more acute there than elsewhere. Tobacco, the other great cash crop in parts of the eastern Cotton Belt, is intertilled also and therefore tends toward soil erosion and depletion of soil fertility unless control measures, such as the use of winter cover crop, crop rotations and terracing are followed. On the other hand the productivity of soils in many regions of the Cotton Belt has been maintained or even improved by crop rotations, the growing of legumes, and the judicious use of fertilizers. Both cotton and tobacco require much labor in their cultivation, but as there is relatively little use of power to multiply production per worker, the plane of living is low and the birthrate is high, with a resulting comparatively high pressure of population.

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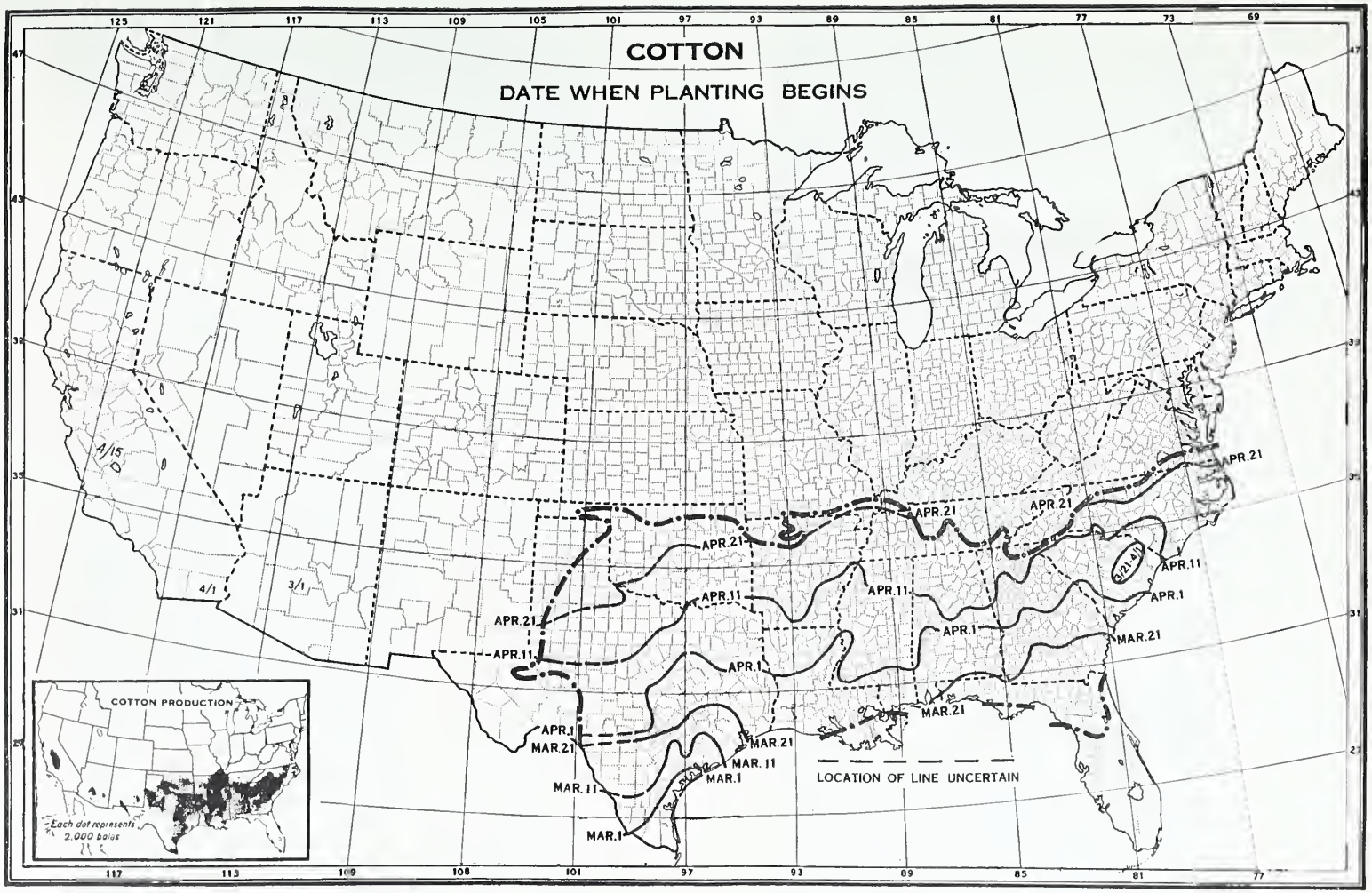


FIGURE 65.—Cotton planting begins usually about the middle of March in extreme southern Texas and in northern Florida; about April 1 in the Black Waxy Prairie of Texas, in central Louisiana, central Alabama, and central Georgia; and about April 21 along the northern margin of the Cotton Belt. Labor for planting cotton varies widely in different areas. In the eastern cotton areas one-row planters are commonly used. With this method of planting about 2 hours each of man labor and mule work are used for planting an acre of cotton. Tractor-drawn planters are in common use in the western dry land and in the irrigated areas. With a two-row, tractor-drawn, lister planter, about 0.6 hour each of man labor and tractor work are used in planting an acre of cotton.

BAE 37762

FIGURE 66.—One-row planters are extensively used for planting cotton, corn, and other row crops in the old Cotton Belt and in the adjoining States to the north. Planting 5 to 6 acres is about a day's work with a row planter and a crew consisting of one worker and one work animal.

BAE 37780

FIGURE 67.—Two-row lister planters are used for planting cotton in the western dry areas of Texas and Oklahoma. With a medium-sized tractor and a two-row cotton planter, a man usually plants about 18 acres of cotton in a 10-hour day.

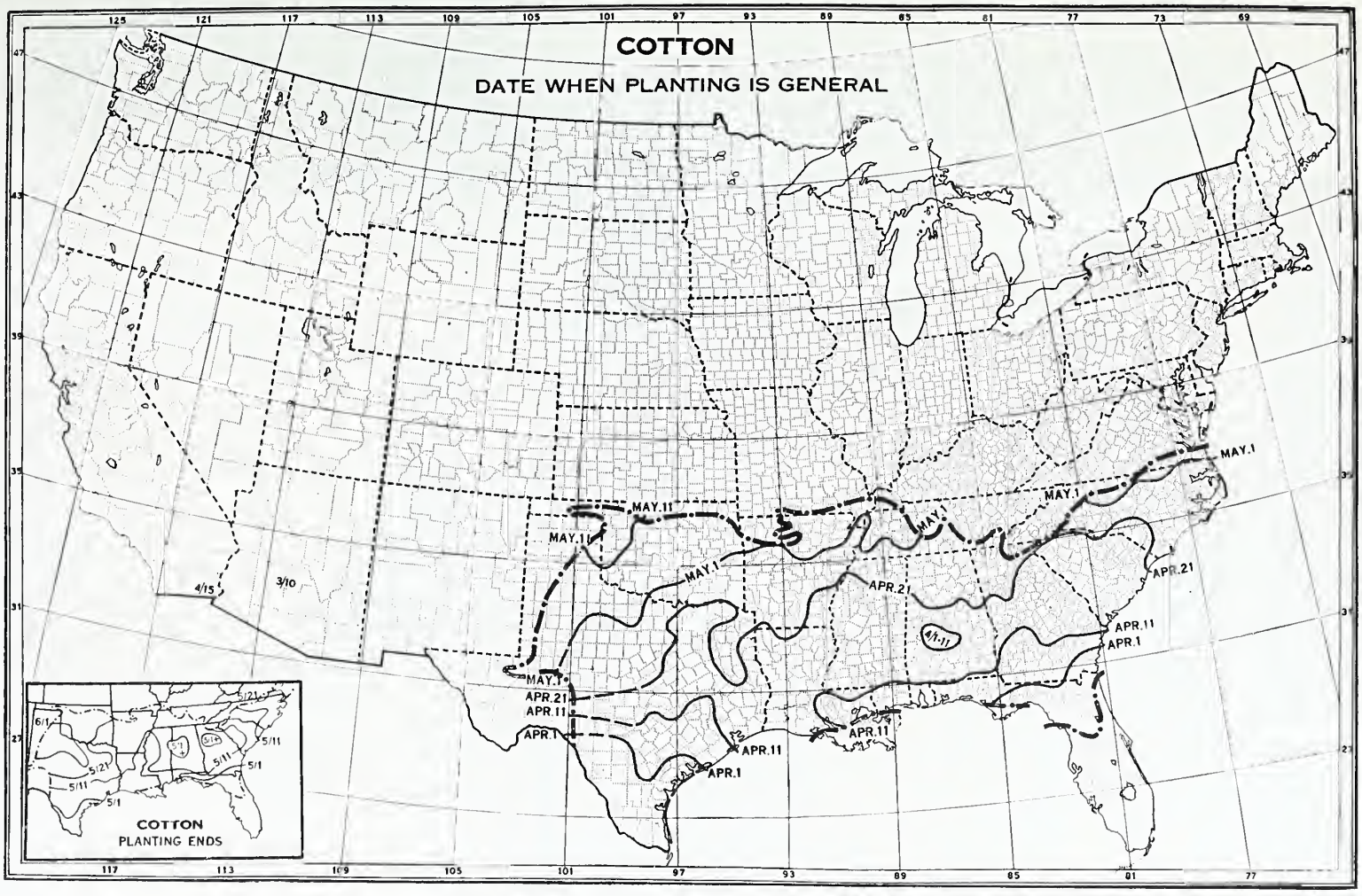


FIGURE 68.—Cotton planting is general throughout most of the belt in April, but is practically finished by May 15. In some years, owing to unusual conditions, such as floods, cotton is replanted as late as June 15. Labor per acre for preharvest work is relatively high along the Atlantic coast and low in the western dry areas. In the South Atlantic States where one-mule equipment is commonly used, from 60 to 70 hours of man labor and from 40 to 45 hours of mule work are used per acre for all preharvest work. On tractor-operated farms in the western dry areas where fields are generally level, and little hand work is needed, from 10 to 15 hours of man labor and about 4.0 hours of tractor work are used for preharvest work on an acre of cotton.

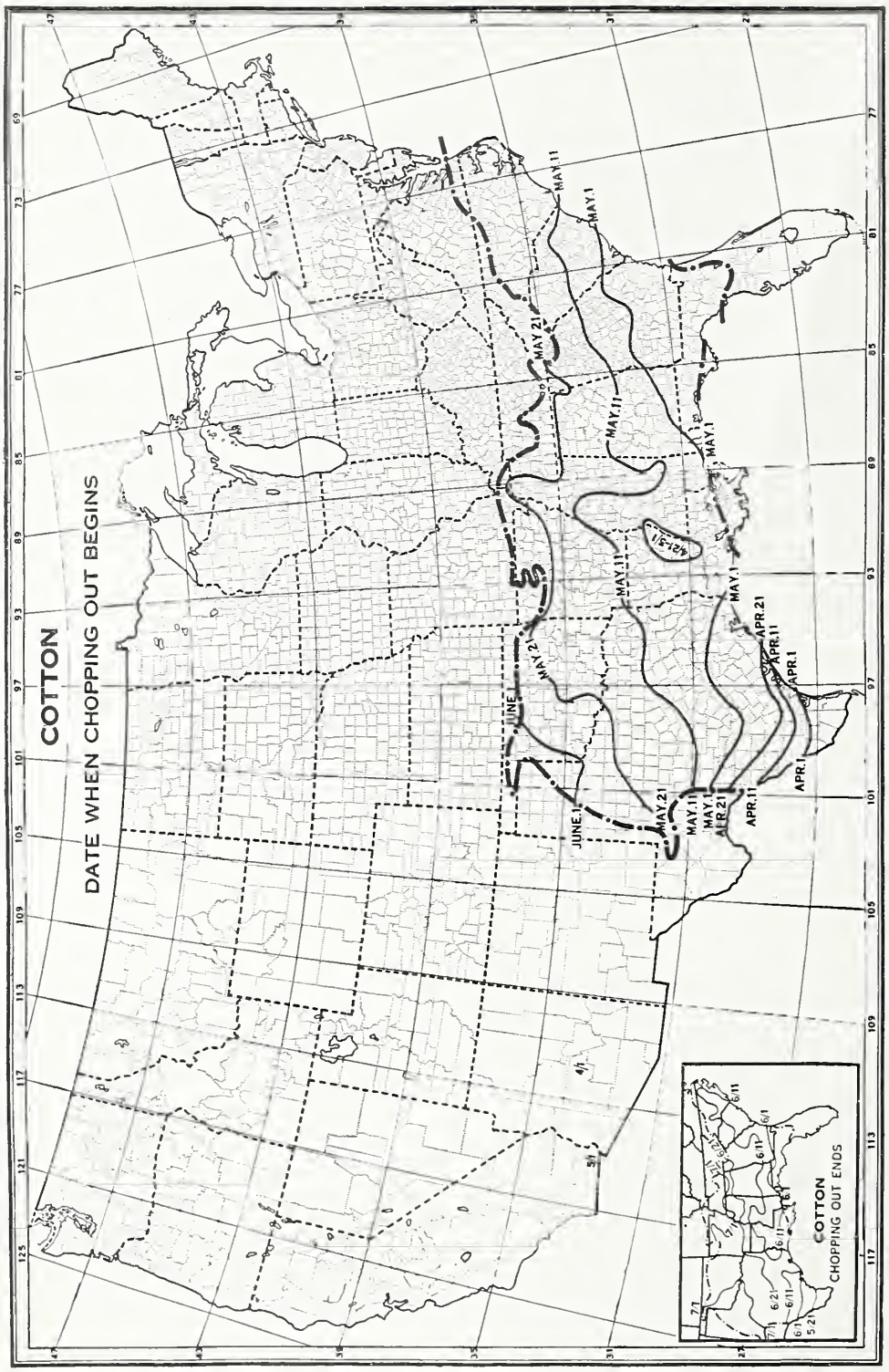
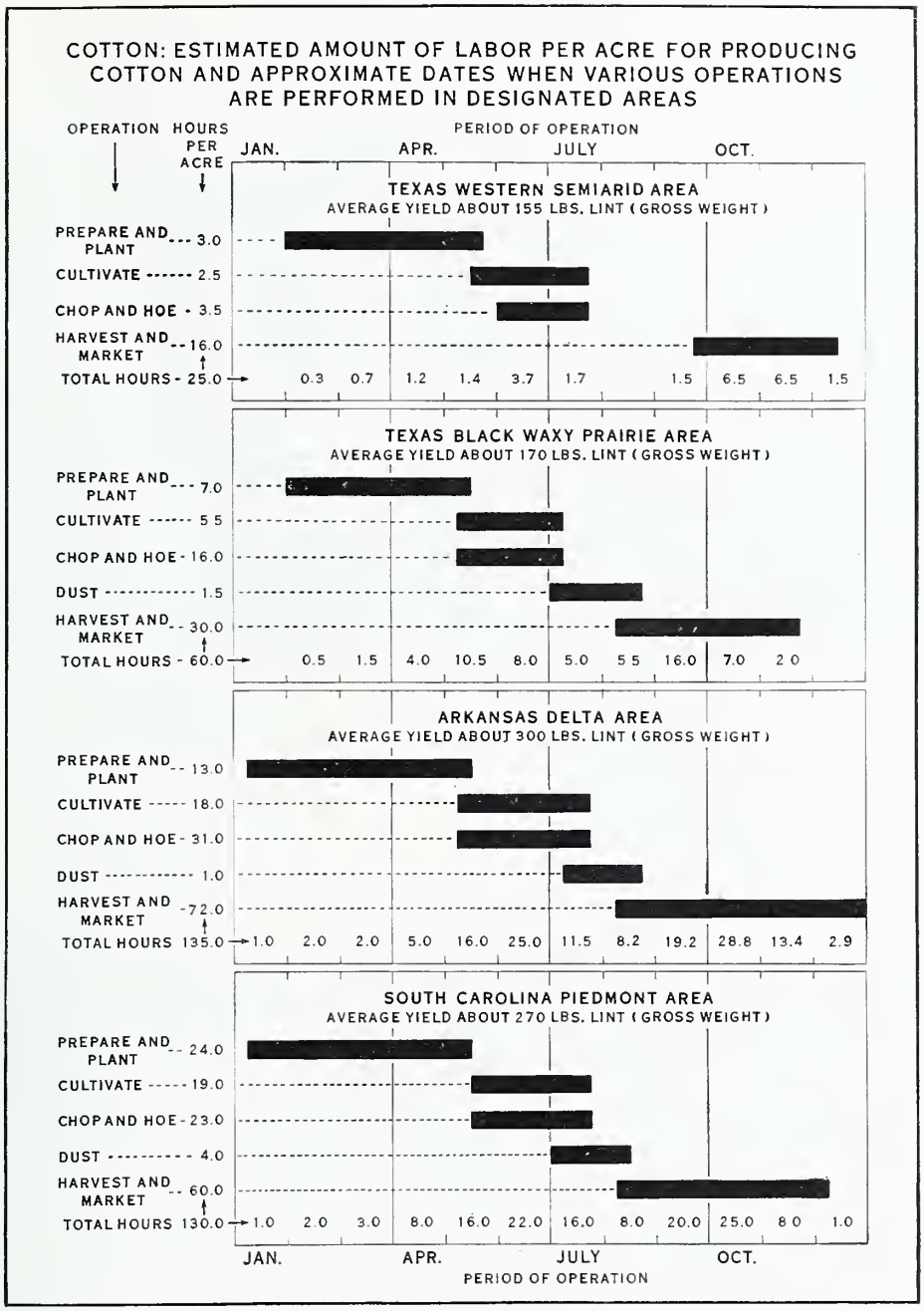


FIGURE 69.—Cotton utilizes more hand labor than any other crop grown so extensively. Except for harvesting, more labor is used for chopping and hoeing than for any other operation. Chopping usually begins about a month after planting in or about May 1 in the southern part of the Cotton Belt and May 21 along the northern margin and ends a month later. In the humid areas adjacent to and east of the Mississippi River, usually from 20 to 30 hours of hoe work are required per acre. In western Oklahoma and Texas, only about one-fourth as much hoe work is used as in the humid areas.


COTTON: ESTIMATED AMOUNT OF LABOR PER ACRE FOR PRODUCING COTTON AND APPROXIMATE DATES WHEN VARIOUS OPERATIONS ARE PERFORMED IN DESIGNATED AREAS
OPERATION
HOURS PER ACRE
PERIOD OF OPERATION
JAN.
APR.
JULY
OCT.
TEXAS WESTERN SEMIARID AREA
AVERAGE YIELD ABOUT 155 LBS. LINT (GROSS WEIGHT)
PREPARE AND PLANT 3.0
CULTIVATE 2.5
CHOP AND HOE 3.5
HARVEST AND MARKET 16.0
TOTAL HOURS 25.0
0.3 0.7 1.2 1.4 3.7 1.7 1.5 6.5 6.5 1.5
TEXAS BLACK WAXY PRAIRIE AREA
AVERAGE YIELD ABOUT 170 LBS. LINT (GROSS WEIGHT)
PREPARE AND PLANT 7.0
CULTIVATE 5.5
CHOP AND HOE 16.0
DUST 1.5
HARVEST AND MARKET 30.0
TOTAL HOURS 60.0
0.5 1.5 4.0 10.5 8.0 5.0 5.5 16.0 7.0 2.0
ARKANSAS DELTA AREA
AVERAGE YIELD ABOUT 300 LBS. LINT (GROSS WEIGHT)
PREPARE AND PLANT 13.0
CULTIVATE 18.0
CHOP AND HOE 31.0
DUST 1.0
HARVEST AND MARKET 72.0
TOTAL HOURS 135.0
1.0 2.0 2.0 5.0 16.0 25.0 11.5 8.2 19.2 28.8 13.4 2.9
SOUTH CAROLINA PIEDMONT AREA
AVERAGE YIELD ABOUT 270 LBS. LINT (GROSS WEIGHT)
PREPARE AND PLANT 24.0
CULTIVATE 19.0
CHOP AND HOE 23.0
DUST 4.0
HARVEST AND MARKET 60.0
TOTAL HOURS 130.0
1.0 2.0 3.0 8.0 16.0 22.0 16.0 8.0 20.0 25.0 8.0 1.0
JAN.
APR.
JULY
OCT.
PERIOD OF OPERATION

BAE 39319

FIGURE 70.—The per acre yield of cotton, the size of implements used, the harvest methods, and climatic conditions are the principal factors responsible for differences in the labor used in cotton production. In the western dry areas, the crop is gathered largely by "snapping." This, the dry climate, and the large power units and machines make it possible to produce an acre of cotton with less labor than in other areas. Relatively large machines are used in the Black Prairie of Texas, but the rainfall is heavier and the crop is largely picked and so more labor is needed for producing an acre of cotton than in the western dry areas. In the Delta and Piedmont sections, relatively large amounts of labor are used per acre, because the yield of cotton is relatively high; small implements and machines are generally used; the crop is harvested by picking; and the weather encourages the growth of weeds.

BAE 2269

FIGURE 71.—One-animal cultivators are extensively used in the States of the old Cotton Belt, to the north, and along the Middle Atlantic seacoast. With cultivators of this type, two trips are needed to each row for every cultivation. Usually about 3 acres is a fair day's work for a crew of one man and one work animal when one-half-row cultivators are used.

EXT S 6378

FIGURE 72.—Two-row tractor-drawn cultivators are used principally in areas where the cotton fields are level and where fairly large acreages of cotton are grown per farm. When the plants are small the cultivator is usually operated at a low speed to avoid covering the young plants. With a two-row tractor-drawn cultivator about 15 acres can be cultivated in a day in the early cultivations when the plants are small, and about 20 acres in the later cultivations.

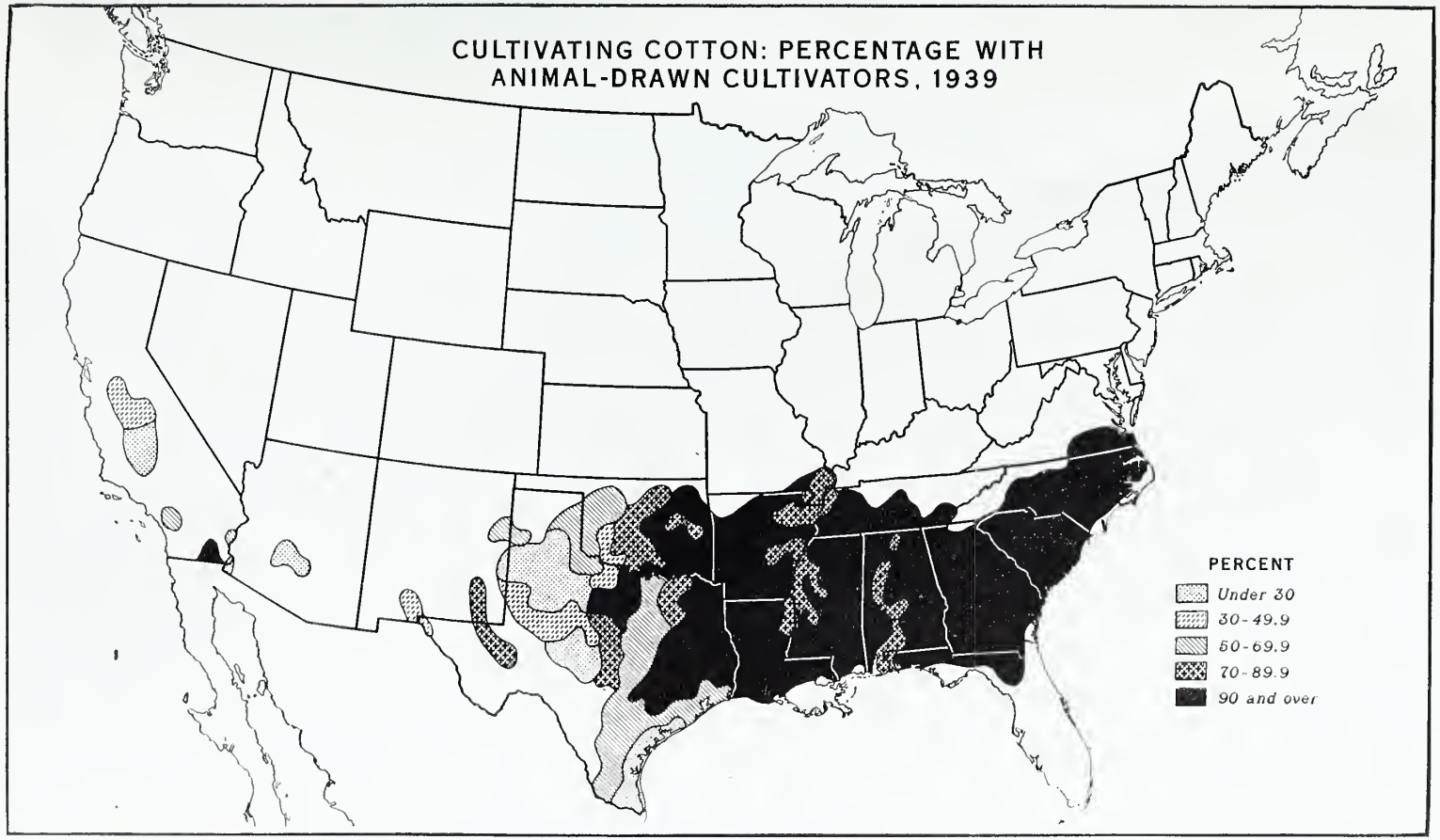


FIGURE 73.—Almost 25 million acres of land were planted to cotton in 1939. This crop is usually cultivated from four to seven times, with more frequent cultivations in the humid and irrigated areas than in the dry areas. Work animals furnish most of the power for the cultivating. More than 90 percent was done with animal-drawn cultivators in the territory that begins with eastern Oklahoma and eastern Texas and includes all cotton country to the east except the river bottoms and south-central Alabama. Tractor-drawn cultivators were used to the greatest extent in western Texas and in Arizona and California, but their use in central Texas and western Oklahoma was important.

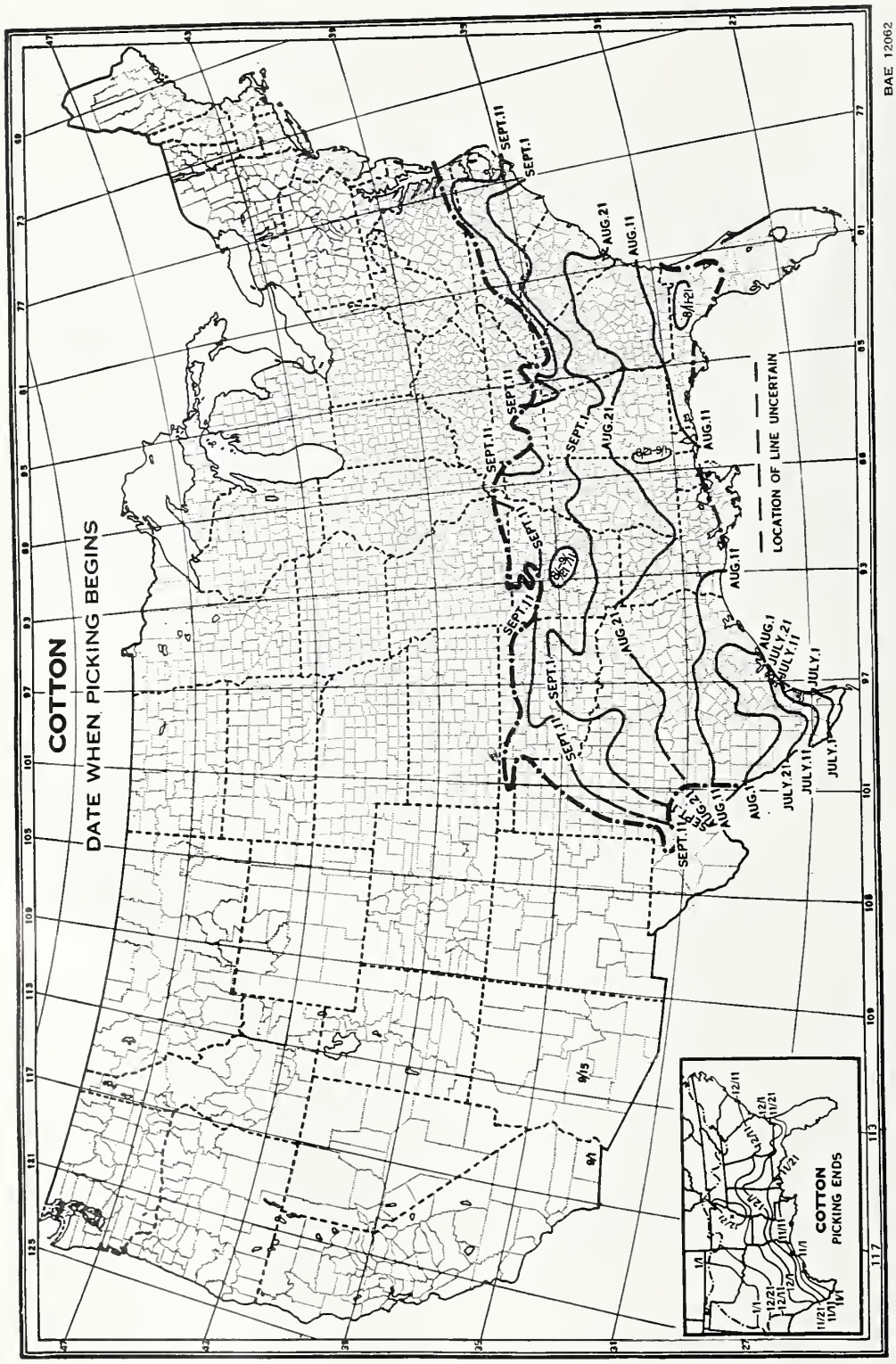


FIGURE 74.—The picking of cotton begins in late June and continues throughout the fall, being finished usually about December. More labor is used for harvesting cotton than for any other cotton operation. The quantity of labor used per acre depends principally on the yield and the harvest method. In the humid sections practically all the crop is harvested by picking, whereas in the subhumid areas snapping is the more common harvest method. In the humid sections an adult worker will usually gather the equivalent of about 50 pounds of lint per day. More than double this quantity of lint is gathered by the average adult in the western dry areas when snapping is the method.

BPI 23846

FIGURE 75.—In most cotton areas more than 40 percent of the total labor is utilized for harvesting and marketing the crop. Most fields are harvested from two to three times. The quantity harvested per working day varies principally with the yield, the climate, and the harvest method. In all areas more cotton is gathered per day in the early and middle part of the harvest season than in the late season; and in the irrigated and subhumid areas more seed cotton is gathered per working day than is gathered in the humid areas.

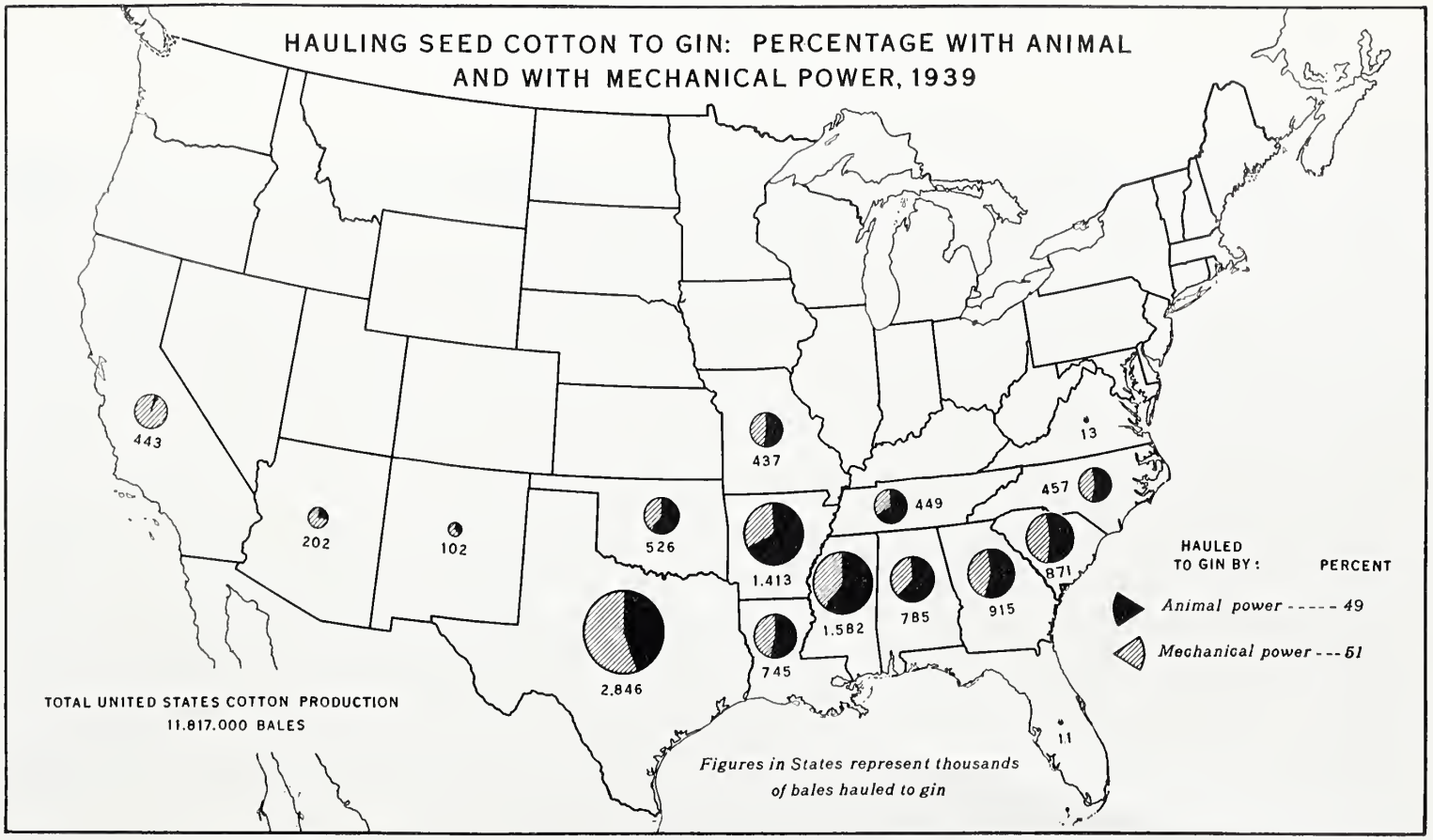


FIGURE 76.—Mechanical power, supplied largely by motortrucks and automobiles, is now used for moving most of the products sold off farms to receiving markets. However, animal-drawn vehicles were used for delivering to cotton gins almost half of the seed cotton produced in 1939 in the 14 States surveyed; these States produced more than 99 percent of the cotton crop. Use of animal power for hauling seed cotton was most pronounced in the States bordering the Mississippi River and in Alabama. Mechanical power was used for hauling the bulk of the seed cotton produced in the irrigated cotton areas and in Texas and Oklahoma.

BAE M262

FIGURE 77.—During the peak of the ginning season, the cotton gins often operate on a day and a night shift and even so farmers often spend considerable time awaiting their turn at the gin. When teams are used, one day is often required for loading and hauling to the gin enough seed cotton to make a bale of lint (approximately 500 pounds gross weight).

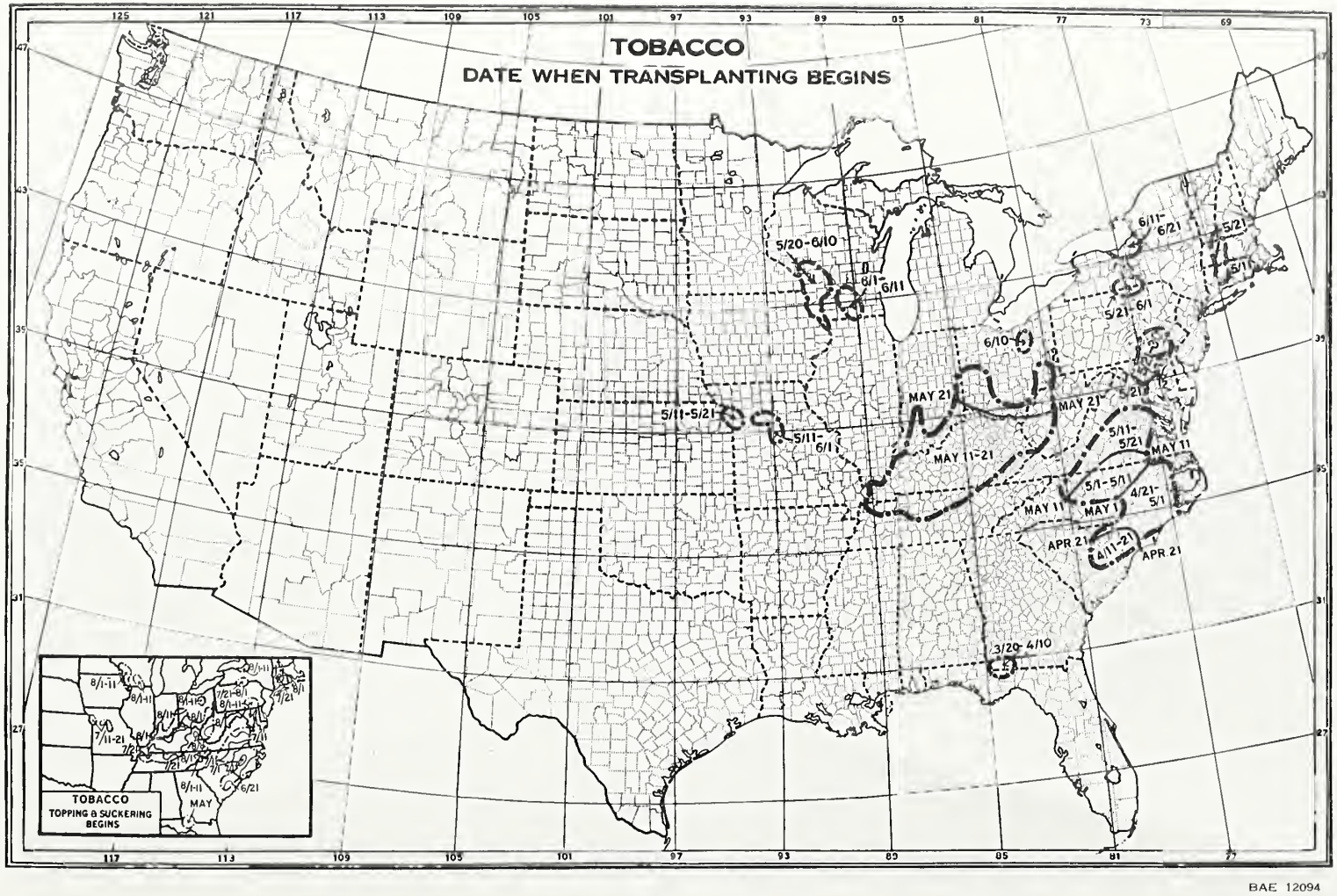
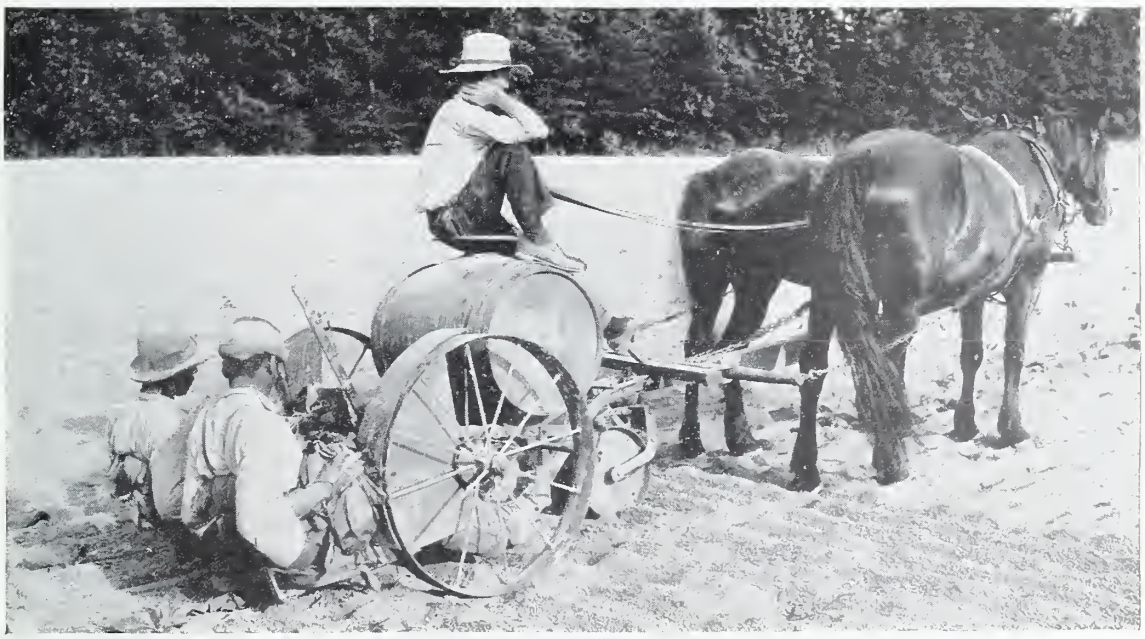


FIGURE 78.—Burley and dark tobaccos are grown mainly on the limestone soils of Kentucky and adjoining States. Tobacco for cigar wrappers, binders, and fillers is grown in scattered localities in Pennsylvania, Ohio, New England, Wisconsin, and Florida. Flue-cured tobacco is extensively grown in coastal areas of Virginia, the Carolinas, Georgia, and Florida, mostly on sandy soils. Tobacco is sown in beds early in the spring and is later transplanted. In the central districts the transplanting begins about May 10 and continues to about June 1.

PI 8322

FIGURE 79.—Much of the tobacco acreage is planted by hand methods. Before planting time the hills are usually marked off with either an animal-drawn marker or a hoe. The plants are removed from the bed and are dropped by the marked hills. They are then set in the ground, usually with a home-made wooden peg. Often considerable replanting is necessary. Usually from 25 to 35 hours of labor are used for planting and replanting an acre of tobacco by hand methods. Suitable moisture conditions are essential; in dry periods the planting of tobacco may be considerably delayed if planting is to be by hand.



EXT S 8747 C

FIGURE 80.—Transplanting machines are used to a considerable extent in some tobacco areas. They can also be used for transplanting sweetpotatoes, cabbage, tomatoes, and other plants. When these machines are used, the plants are automatically watered when set. For pulling plants, hauling water, and for transplanting, from 20 to 30 hours of labor are used for each acre of tobacco plants set. Often some additional labor is needed for replanting.

PI 2416

FIGURE 81.—Most of the flue-cured tobacco and shade-grown cigar tobacco is harvested by priming. The stripped leaves are then strung on sticks and placed in the curing barn. For harvesting an acre of flue-cured tobacco by the priming method, usually from 125 to 150 hours of labor are required. Women and children work extensively in tobacco, especially in stringing the leaves.

EXT S 9205 C

FIGURE 82.—Flue-cured tobacco and the shade-grown cigar types are harvested largely by removing the ripened leaves from the standing stalk. The lower leaves are the first to ripen. Usually the field is gone over three or more times when harvesting is done by priming or pulling leaves. After leaves are pulled they are usually hauled to a shady spot near the curing barn, strung on sticks, and placed in the curing barn.

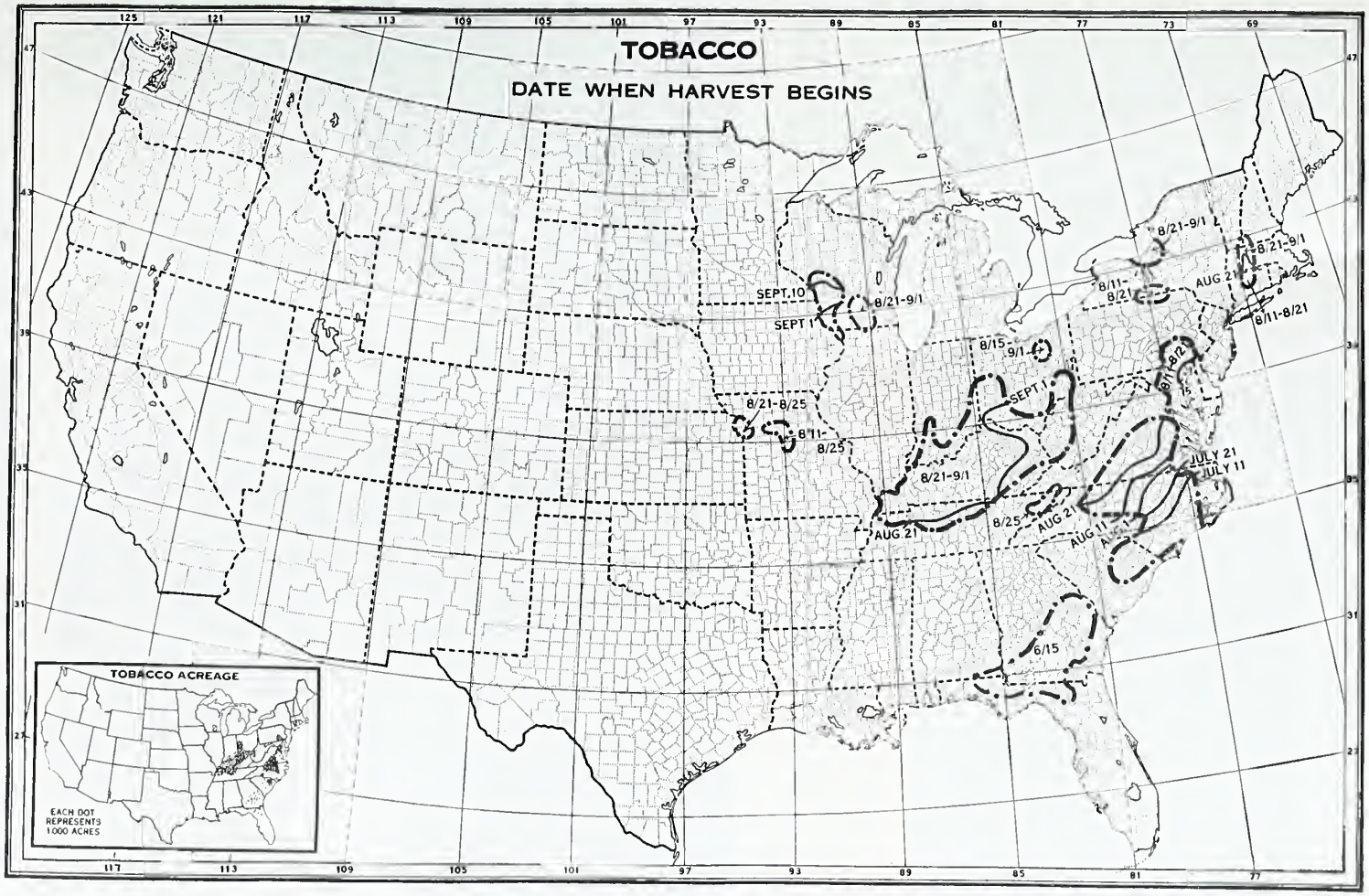


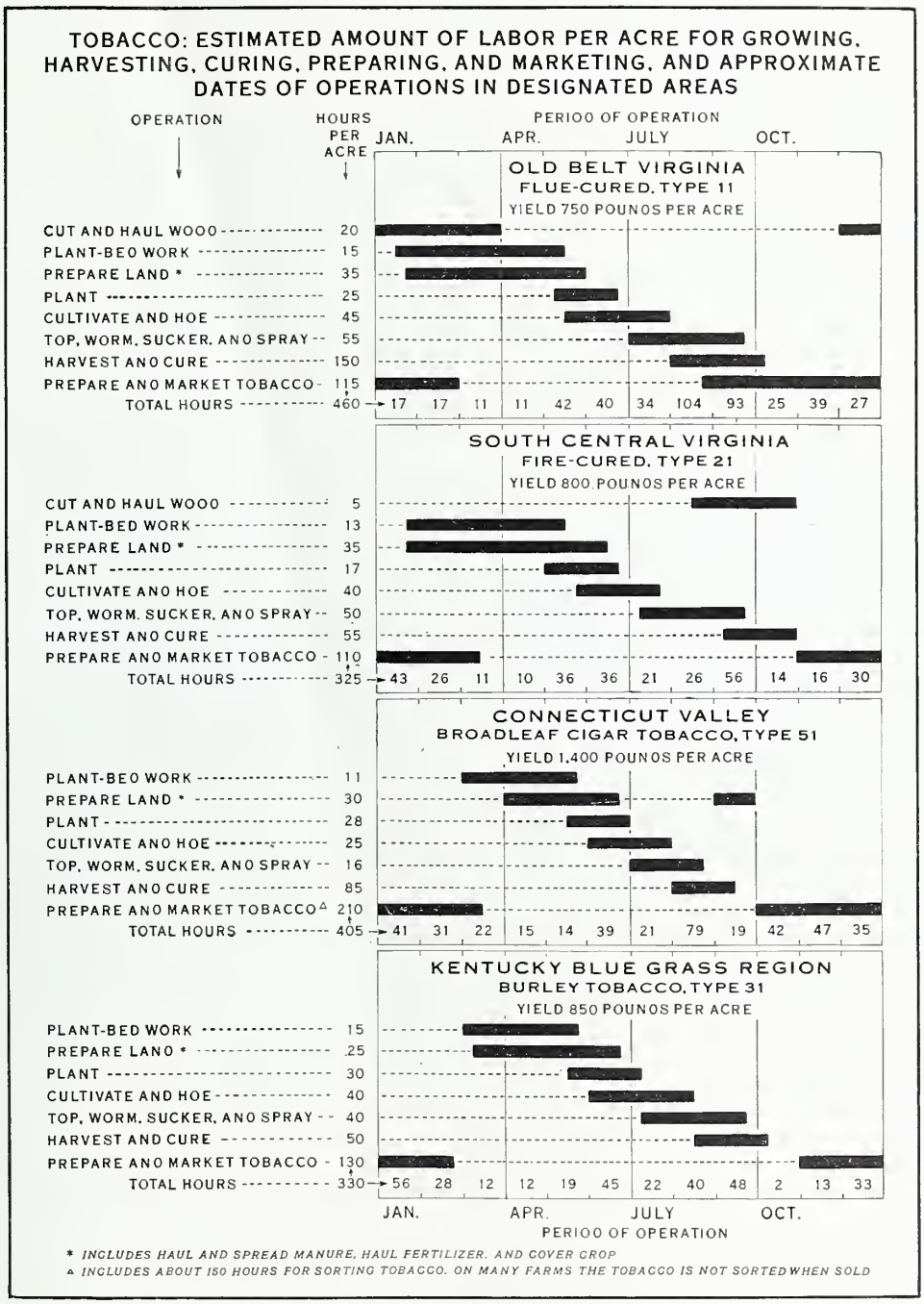
FIGURE 83.—Tobacco is generally ready to harvest about 3 months after it is transplanted. In western Florida it is harvested early in June and along the coastal plain of the Carolinas as early as July 11. In many sections, harvesting begins about September 1. For the important flue-cured type an average of about 450 hours of labor are used for growing, harvesting, and marketing an acre of tobacco. For fire-cured tobaccos, dark and light air-cured tobaccos, from 250 to 350 hours are commonly used per acre. It usually takes more labor to cut and house tobacco than the farmer and his family can supply, but there are usually enough laborers in the community for this work.

EXT S 11157 C

FIGURE 84.—In harvesting most tobaccos the stalk is cut and the leaves remain on the stalk until the tobacco is ready for stripping. After being cut the tobacco stalks are placed on tobacco sticks and hauled to the curing barn. In the barn or shed the tobacco is placed and properly spaced on the firing tiers. Usually from 40 to 50 hours of labor are used for cutting and housing an acre of tobacco yielding from 800 to 1,000 pounds.

PI 4843

FIGURE 85.—Preparing tobacco leaf for market is a late fall and wintertime job except in the more southern tobacco areas. When the plant has been harvested by cutting and the curing process is completed the leaves are stripped from the stalk, are sorted by grades, and tied into "hands." From 100 to 150 hours of labor are normally used for preparing and marketing an acre of tobacco.


TOBACCO: ESTIMATED AMOUNT OF LABOR PER ACRE FOR GROWING, HARVESTING, CURING, PREPARING, AND MARKETING, AND APPROXIMATE DATES OF OPERATIONS IN DESIGNATED AREAS
OPERATION
HOURS PER ACRE
PERIOD OF OPERATION
JAN.
APR.
JULY
OCT.
OLD BELT VIRGINIA
FLUE-CURED, TYPE 11
YIELD 750 POUNDS PER ACRE
CUT AND HAUL WOOD 20
PLANT-BED WORK 15
PREPARE LAND * 35
PLANT 25
CULTIVATE AND HOE 45
TOP, WORM, SUCKER, AND SPRAY 55
HARVEST AND CURE 150
PREPARE AND MARKET TOBACCO 115
TOTAL HOURS 460
17 17 11 11 42 40 34 104 93 25 39 27
SOUTH CENTRAL VIRGINIA
FIRE-CURED, TYPE 21
YIELD 800 POUNDS PER ACRE
CUT AND HAUL WOOD 5
PLANT-BED WORK 13
PREPARE LAND * 35
PLANT 17
CULTIVATE AND HOE 40
TOP, WORM, SUCKER, AND SPRAY 50
HARVEST AND CURE 55
PREPARE AND MARKET TOBACCO 110
TOTAL HOURS 325
43 26 11 10 36 36 21 26 56 14 16 30
CONNECTICUT VALLEY
BROADLEAF CIGAR TOBACCO, TYPE 51
YIELD 1,400 POUNDS PER ACRE
PLANT-BED WORK 11
PREPARE LAND * 30
PLANT 28
CULTIVATE AND HOE 25
TOP, WORM, SUCKER, AND SPRAY 16
HARVEST AND CURE 85
PREPARE AND MARKET TOBACCO △ 210
TOTAL HOURS 405
41 31 22 15 14 39 21 79 19 42 47 35
KENTUCKY BLUE GRASS REGION
BURLEY TOBACCO, TYPE 31
YIELD 850 POUNDS PER ACRE
PLANT-BED WORK 15
PREPARE LAND * 25
PLANT 30
CULTIVATE AND HOE 40
TOP, WORM, SUCKER, AND SPRAY 40
HARVEST AND CURE 50
PREPARE AND MARKET TOBACCO 130
TOTAL HOURS 330
56 28 12 12 19 45 22 40 48 2 13 33
JAN.
APR.
JULY
OCT.
PERIOD OF OPERATION
* INCLUDES HAUL AND SPREAD MANURE, HAUL FERTILIZER, AND COVER CROP
△ INCLUDES ABOUT 150 HOURS FOR SORTING TOBACCO. ON MANY FARMS THE TOBACCO IS NOT SORTED WHEN SOLD

BAE 39349

FIGURE 86.—The quantity of labor used in the production and marketing of an acre of tobacco varies with the type of tobacco. Seasonal labor distribution is affected largely by climatic conditions. Of the major tobaccos, flue-cured requires the most labor per acre. Flue-cured is a southern tobacco and consequently is planted, harvested, and marketed earlier than are other tobaccos. Preparing and marketing tobacco is a wintertime job in central and northern tobacco areas. About one-fourth of the total labor used on flue-cured tobaccos is devoted to preparing and marketing the leaf; about one-third is so used with the Burley and Virginia fire-cured; and about half with the Connecticut Valley broadleaf tobacco.

455271°—42——6

POTATOES, BEETS, AND BEANS

Only about one-fourth of the sugar consumed in this country is produced in continental United States. About one-sixth of the supply comes from Hawaii, another sixth from the Philippines, a tenth from Puerto Rice, and a third from Cuba.

Within the United States beets contribute about seven-eighths of the sugar production and sugarcane most of the remainder. Three-fourths of the sugar-beet production in the United States is on irrigated land, principally near the Rocky Mountains, along the rivers as they flow out into the Great Plains, and along the rivers that flow westward from the mountains into Great Salt Lake or into the Pacific Ocean. Formerly, California was one of the leading sugar-beet States, and an extensive acreage is still found in the valleys that open onto the cool Pacific coast. The sugar-beet acreage dependent on natural rainfall is located in districts mostly along the northern margin of the Corn Belt.

The labor requirements for sugar-beet production are large per acre and are highly irregular seasonally. The laborers are mainly transient, and many are immigrants, chiefly from Mexico.

Potatoes, like sugar beets, are grown commercially, principally along the northern margin of the Corn Belt and in the valleys of the Far West, both because of their suitability to that climate and the competition of corn for the land to the south and east. But unlike sugar beets, potatoes are grown for home or local use throughout the Corn Belt, even in parts of the Cotton Belt and Gulf Coast, where a winter crop is raised; and some of the largest producing areas are in the Northeast, where sugar beets are not grown. No other crop, except hay, is reported from so many counties in the United States as potatoes.

Nevertheless, the acreage of potatoes has remained more or less stationary for a third of a century, and the trend of acre yields has been horizontal for half as long. Since the beginning of the century the population of the Nation has increased about 60 percent. The consumption (disappearance) of potatoes per person during the years 1902–1906 averaged 190 pounds a year, and in each succeeding 5-year period was as follows: 176, 165, 162, 155, 146, and 144 pounds. Much labor is required in the production of potatoes, but power machinery is being used increasingly and rapid mechanization by large growers is making production by the small growers increasingly difficult.

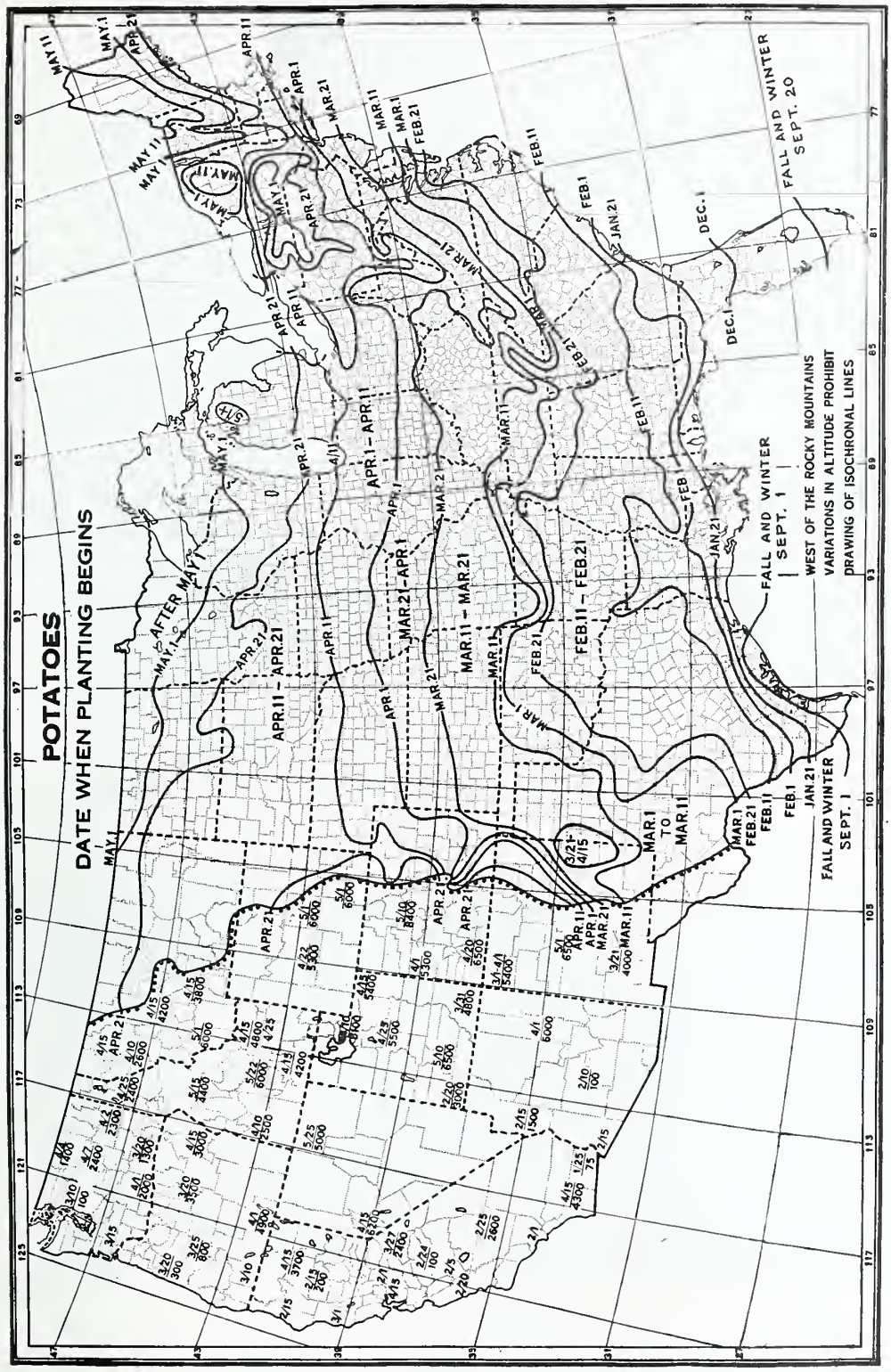

POTATOES
DATE WHEN PLANTING BEGINS
AFTER MAY 1
MAY 1
APR. 11 – APR. 21
APR. 1 – APR. 11
MAR. 21 – APR. 1
MAR. 11 – MAR. 21
FEB. 21 – MAR. 11
FEB. 11 – FEB. 21
MAR. 1 TO MAR. 11
FALL AND WINTER SEPT. 1
FALL AND WINTER SEPT. 20
WEST OF THE ROCKY MOUNTAINS VARIATIONS IN ALTITUDE PROHIBIT DRAWING OF ISOCHRONAL LINES
BAE 12089

FIGURE 87.—Early potatoes form only a small part of the potato crop of the United States, and their commercial production is developed principally in the South Atlantic and Gulf States, whence they are shipped by both rail and boat, to the northern cities. Early potatoes are not a commercial crop north of New York City, but a few are planted for home use. In northern Maine and northern Minnesota this planting begins about May 11, and practically coincides with the planting of the late-potato crop, which is the commercial crop in the Northern States. This map shows the progress of the season northward in the United States. In southern Florida and in the lower Rio Grande valley of Texas date lines are indicated for fall and winter crop.

EXT S 19440 C

FIGURE 88.—About 42 percent of the potato acreage was planted by dropping the seed from the hand, or with hand planters in 1939. Hand methods are followed almost exclusively in areas where potato production is small and planting with hand planters still persists in some commercial areas. After the ground is plowed and harrowed, probably about 20 hours of labor per acre are required for the various operations involved in planting potatoes by hand methods.

EXT S 19436

FIGURE 89.—Machine planting of potatoes is found largely in the commercial potato areas. Almost 60 percent of the 1939 potato acreage in the 36 States surveyed was planted with machines. Only 16 percent of the acreage was planted with planters drawn by tractor power; the two-row tractor planter is found principally on farms with 50 or more acres of potatoes. When 15 bushels of seed are planted per acre, it takes about 8 hours of man labor to treat and cut the seed, haul seed to the field, and plant an acre of potatoes with a two-row tractor-drawn planter.

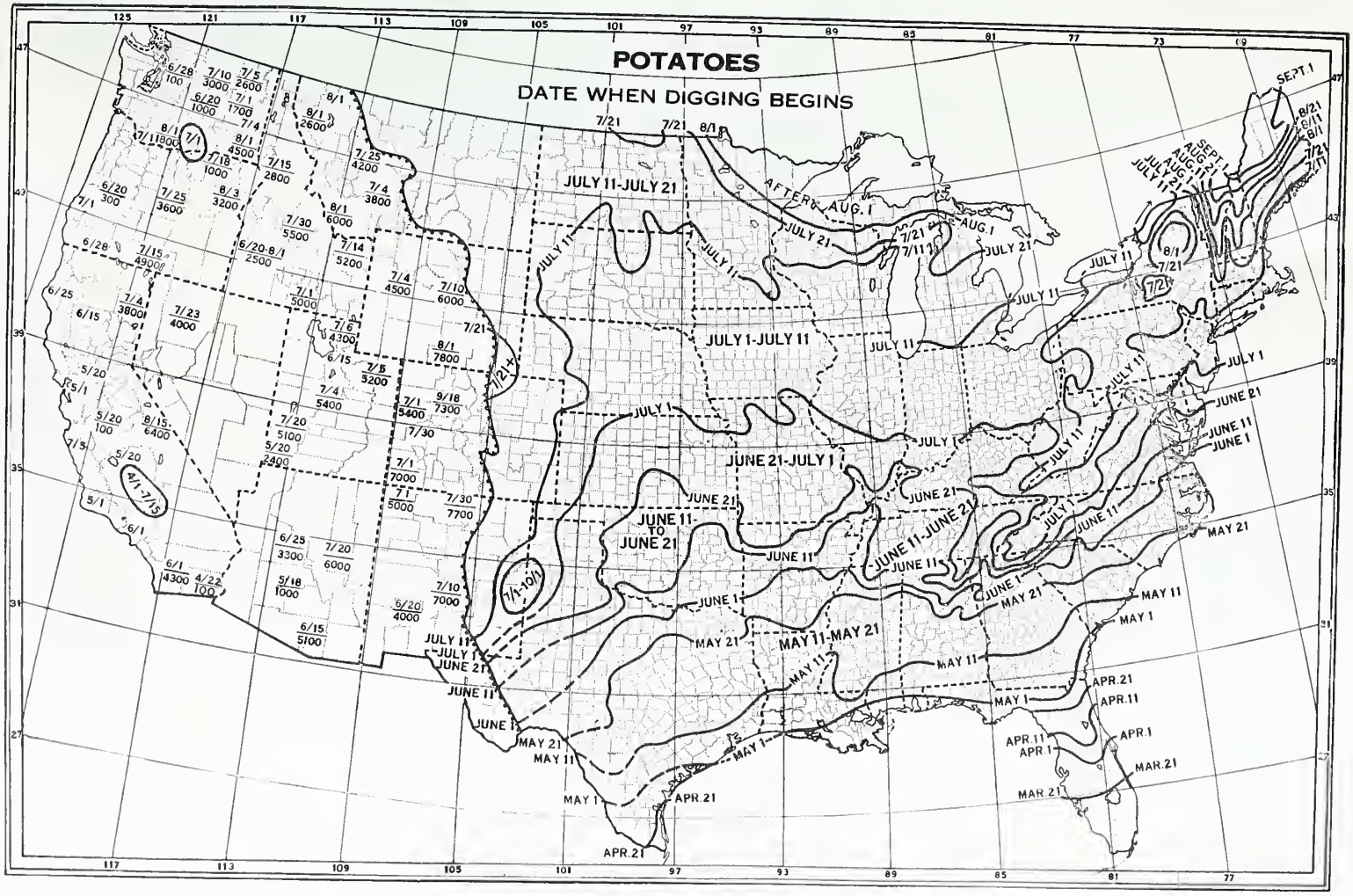


FIGURE 90.—The digging of early potatoes begins in southern Florida from December to March; in the district around Hastings Fla., usually about April 11; and by May 5 digging has begun near Charleston, S. C. It is in progress in the Eastern Shore usually by June 10, and begins on Long Island about July 1. When the Charleston shipments begin, the Hastings shipments are about completed and likewise when the Norfolk shipments begin the Charleston season soon ends. On Long Island, if prices are high, the crop is dug during July and sold but if prices are low the potatoes are not dug until September.

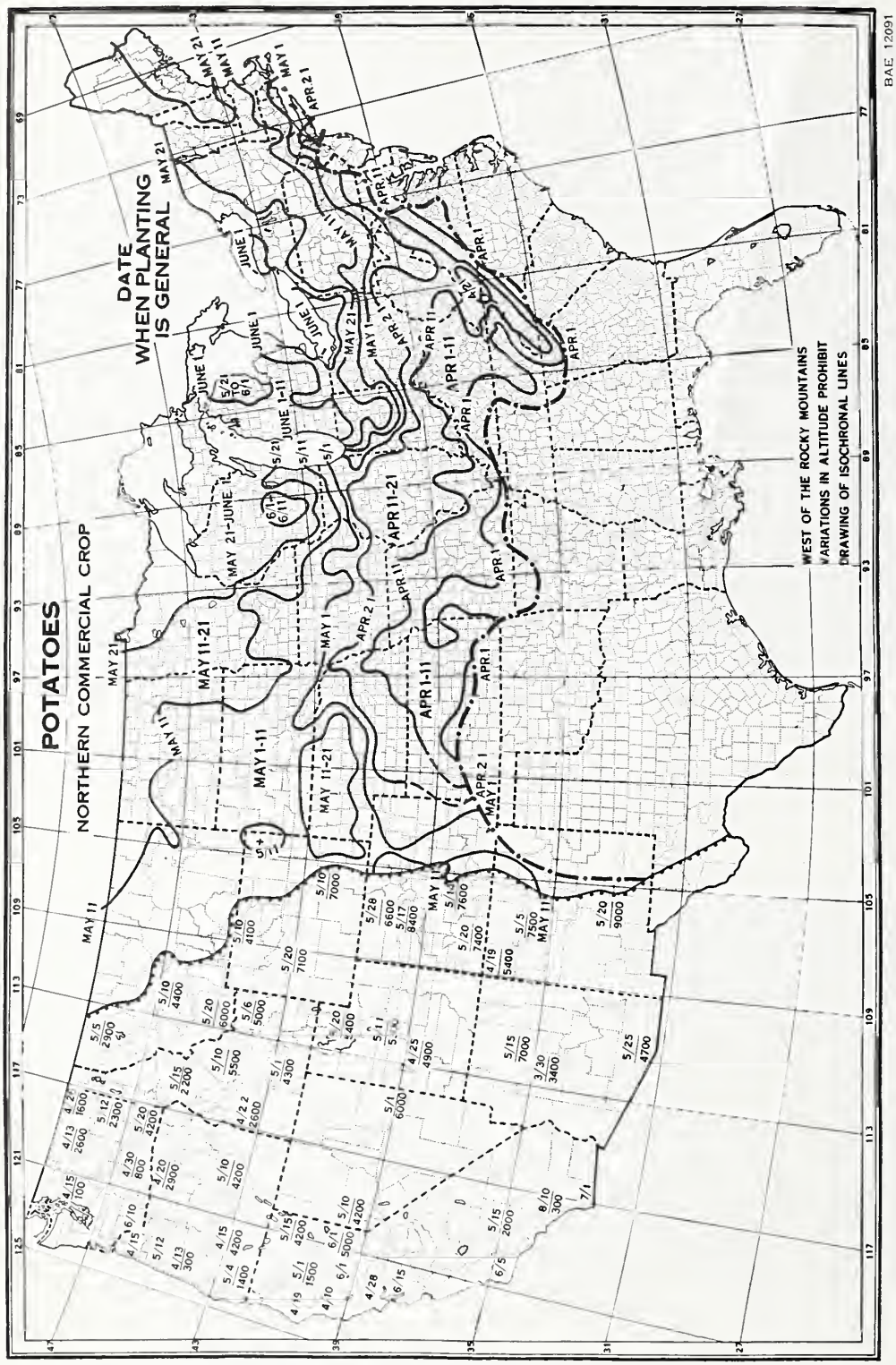


FIGURE 91.—The late-potato crop constitutes over 90 percent of the total potato production of the United States. In practically all the large producing centers, except in California, this crop is planted during April and May. Topography and the acreage of potatoes grown per farm are important factors influencing the labor and power used per acre before harvest. In New York, where the potato acreage per farm is small and the topography undulating to rolling, about 27 hours of man labor, 16 hours of horse work, and 5.6 hours of tractor work are normally used on an acre of potatoes before harvest. In the Red River Valley of Minnesota where the land is level and the potato acreage per farm large, the preharvest labor on potatoes is about 70 percent as much as in New York.

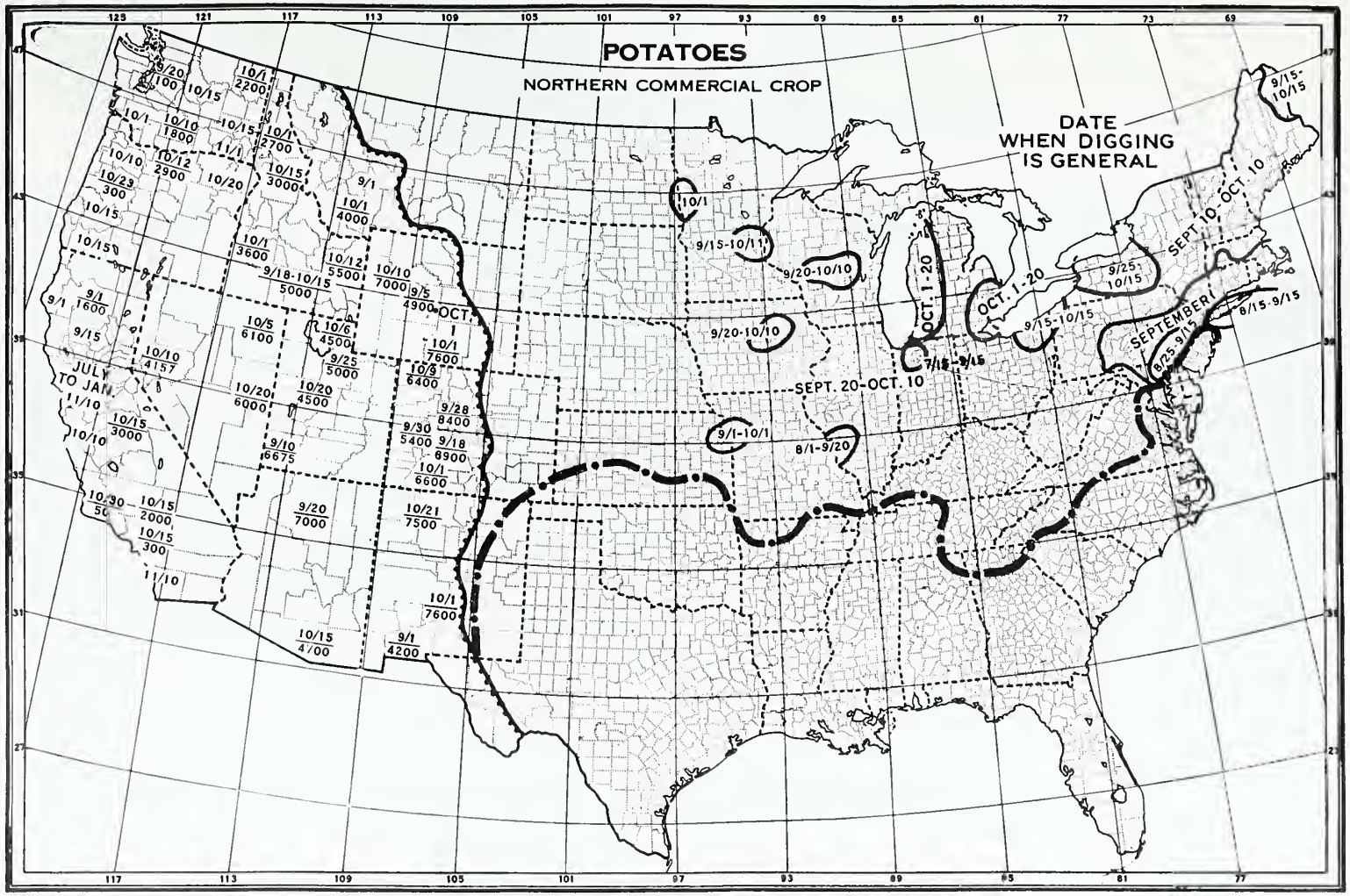


FIGURE 92.—The digging of late potatoes in all the large producing districts, except in California, occurs usually between September 15 and October 11. The earliest digging generally takes place around the large cities. Because of the moderate autumn temperature along the Lake shores in Michigan and New York, digging may be delayed to the latter half of October. In New York, with a yield of 125 bushels of potatoes per acre, approximately 45 hours of man labor, 7 hours of horse work, 1.5 hours of tractor work, and 4 hours of truck work are used to harvest and market an acre of potatoes. On the other hand, in the Red River Valley of Minnesota, with a yield of approximately 90 bushels per acre, the labor for harvesting and marketing an acre of potatoes averages about 20 hours.

FIGURE 93.—Potatoes are often harvested with digging machines, especially in the commercial late-potato areas. Most of the machine diggers are of the one-row type, drawn either by tractor power or by work animals. Some of the two-row diggers are tractor-operated. The two-row digger shown in this illustration was used on a large farm in Maine which yielded 177 barrels per acre in 1940. When a digger is operated at about 3 miles per hour it will dig about 16 acres in 10 hours.

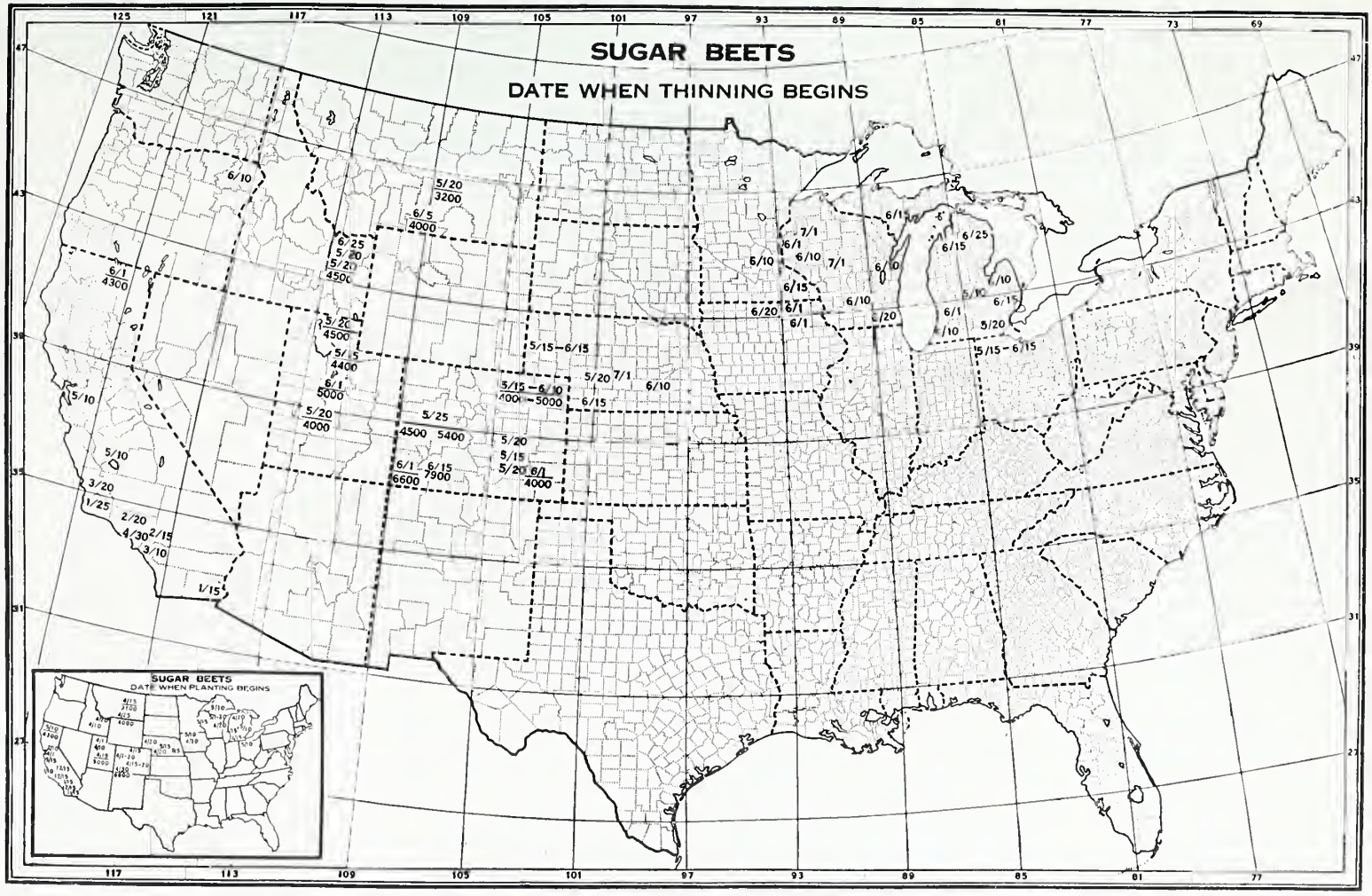


FIGURE 94.—In Michigan and Wisconsin districts and in adjacent States sugar beets are grown under humid conditions, but in California, Colorado, Utah, Idaho, Montana, and other western States the crop is principally grown under irrigation. There is a wide range in the dates when the operations on sugar beets are performed. Planting may begin in California as early as October and may continue as late as the following May. In the irrigated districts of Colorado, Utah, and Idaho, and in Michigan and Wisconsin most of the planting is done from April 25 to May 20. Thinning begins from 3 to 4 weeks after the planting.

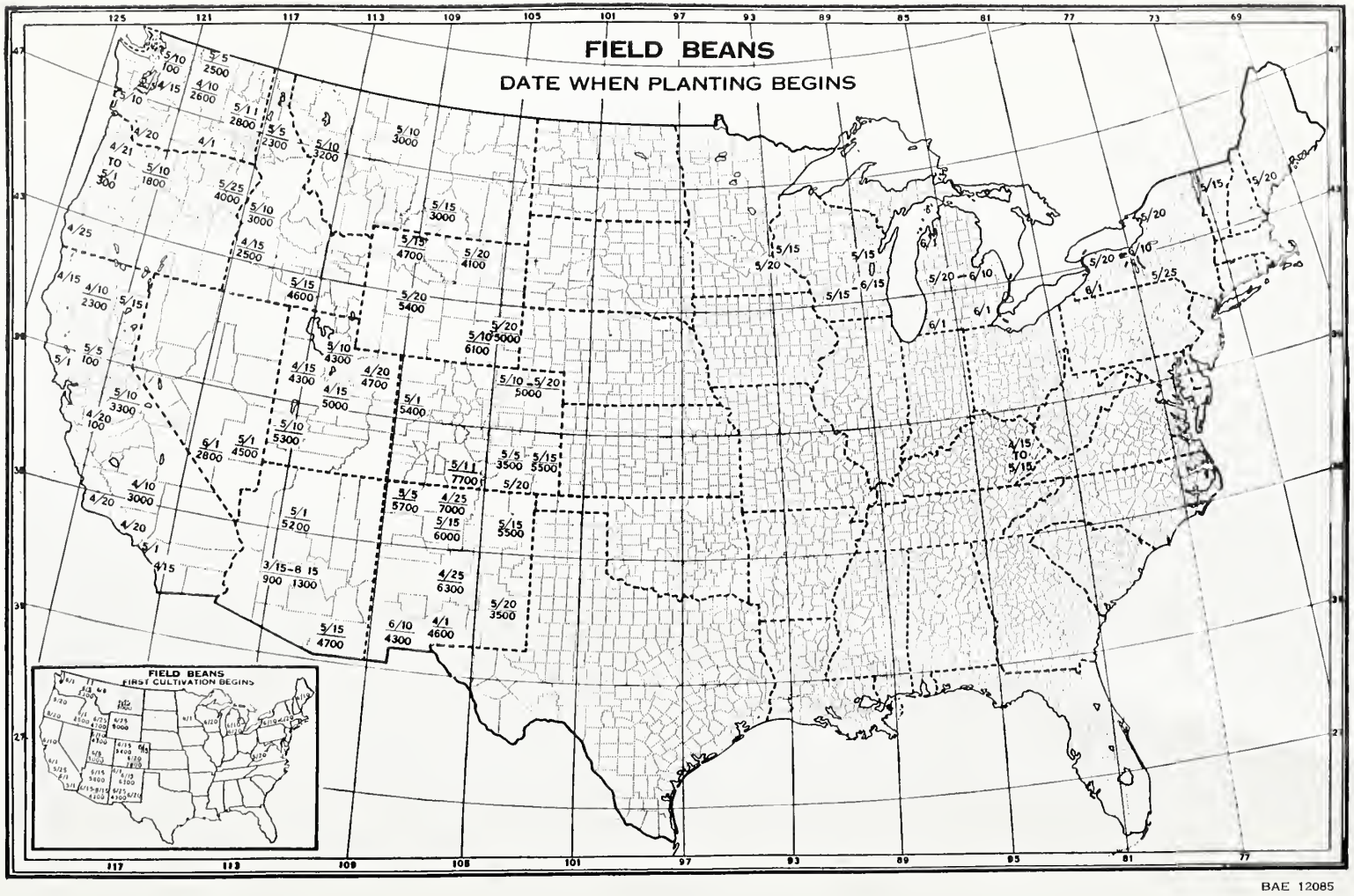


FIGURE 95.—The chief centers of production of dry edible beans are Michigan, California, Idaho, Colorado, and New York. In Michigan and New York navy beans and kidney beans are chiefly grown. In Colorado and New Mexico the pinto or Mexican bean is grown to the exclusion of practically all other varieties. There are two distinct districts in California: the one located along the southern coast produces lima beans exclusively; in the other area (which includes the valleys and coast of central California) pinks, Lady Washington, and navy beans are grown. In Michigan, with a yield of approximately 10 bushels per acre, about 6 hours of man labor, 9 hours of horse work, and 2.5 hours of tractor work are used before the harvest on an acre of navy beans.

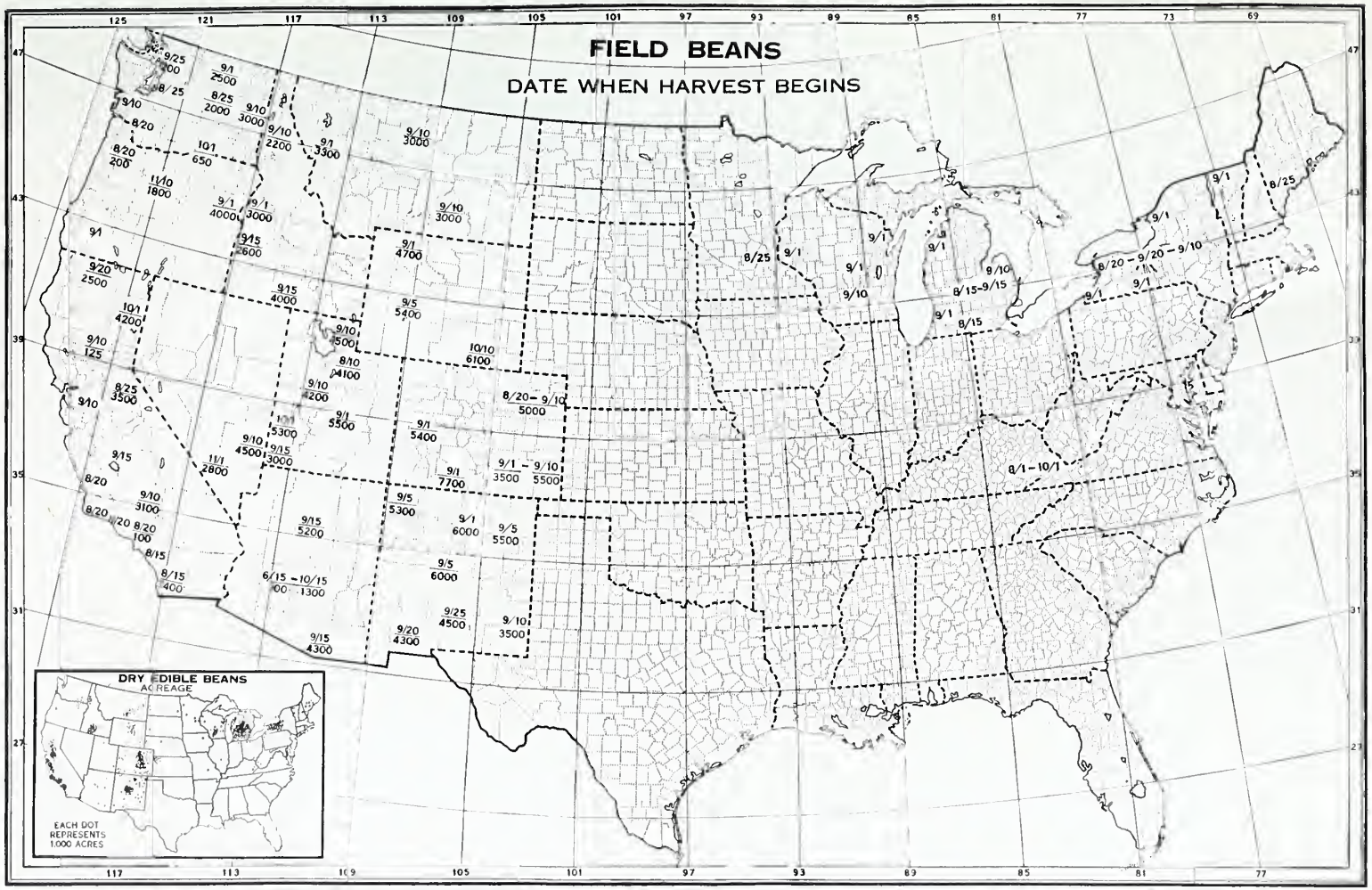


FIGURE 96.—In California and Colorado, beans are harvested from August 15 to September 15. In the dry-farming areas this work does not conflict appreciably with other farm operations, but in the irrigated districts, the completion of the bean harvest may interfere to some extent with potato digging or with beet lifting. Bean growers in Michigan and New York begin harvesting from August 20 to September 20, the most common date being September 1. In the bean-growing counties of Michigan the crop is usually out of the way by the beginning of the sugar-beet harvest. Beans and potatoes compete for labor at this season in some districts in New York. Corn harvest or silo filling may also demand attention at this time.

FRUITS AND NUTS

THE LAND in fruit orchards, vineyards, and planted nut trees, plus that in small fruits, is usually about one-tenth that in wheat or hay. But the average value of the fruits and nuts for 1935–39 totaled about $480,000,000, which was about 68 percent of that of the wheat crop and 70 percent of that of the hay crop. The average value of the fruits and nuts for 1935–39 was about 60 percent of that for potatoes, sweetpotatoes, and vegetables combined, and the acreage was about the same. The acreage in fruit apparently has not changed greatly for years, but with the elimination of farmers' orchards by disease and old age and with gradual concentration of production in commercial orchards, there has been a trend toward higher yields per acre.

The total consumption of fruit per person fluctuates widely from year to year but has been on an upward trend since the beginning of the century. A notable shift has occured from apples to citrus fruit. The annual per capita consumption of fresh apples has decreased from 70 to 40 pounds during the last quarter century, while per capita consumption of citrus fruit has increased from 18 to 62 pounds during the same period. The per capita consumption of oranges has increased fourfold in the third of a century, and for grapefruit the increase has been greater. Consumption of grapes has increased from about 20 pounds a year at the beginning of the century to more than 30 pounds during most of the last 10 years, and the proportionate increase is similar for pears (4 to 5 pounds in the pre-war period of World War No 1, to over 6 pounds in recent years) and prunes (5 or 6 pounds 25 years ago to an average of 8 pounds recently). Per capita consumption of peaches has remained more or less stationary, except for fluctuations from year to year.

Fruit crops require a great deal of labor, particularly at picking time. Except in California, however, there is not a large movement of laborers from one district to another, such as exists in the trucking districts along the Atlantic coast. In California, the migratory laborers who work on the truck crops also work on the fruit crops. Some individuals and families go out from Philadelphia to work in the fruit orchards of New Jersey and there is also a small movement out of Buffalo to the vineyards and fruit orchards nearby. Although there are a few other similar movements, the fruit industry in general depends on local labor.

Fruit crops require the labor of adults to a larger extent than do truck crops. An exception to this statement should be noted with reference to the small fruits. Probably many children are employed in picking berries, as in the "finger work" of truck crops. Women are employed particularly in both the Atlantic and Pacific Coast districts to pick peaches, and still more work in the fruit-packing houses.

"Piece Work" is the customary basis of payment of labor in the fruit industry, and the earnings vary with the weather and market conditions.

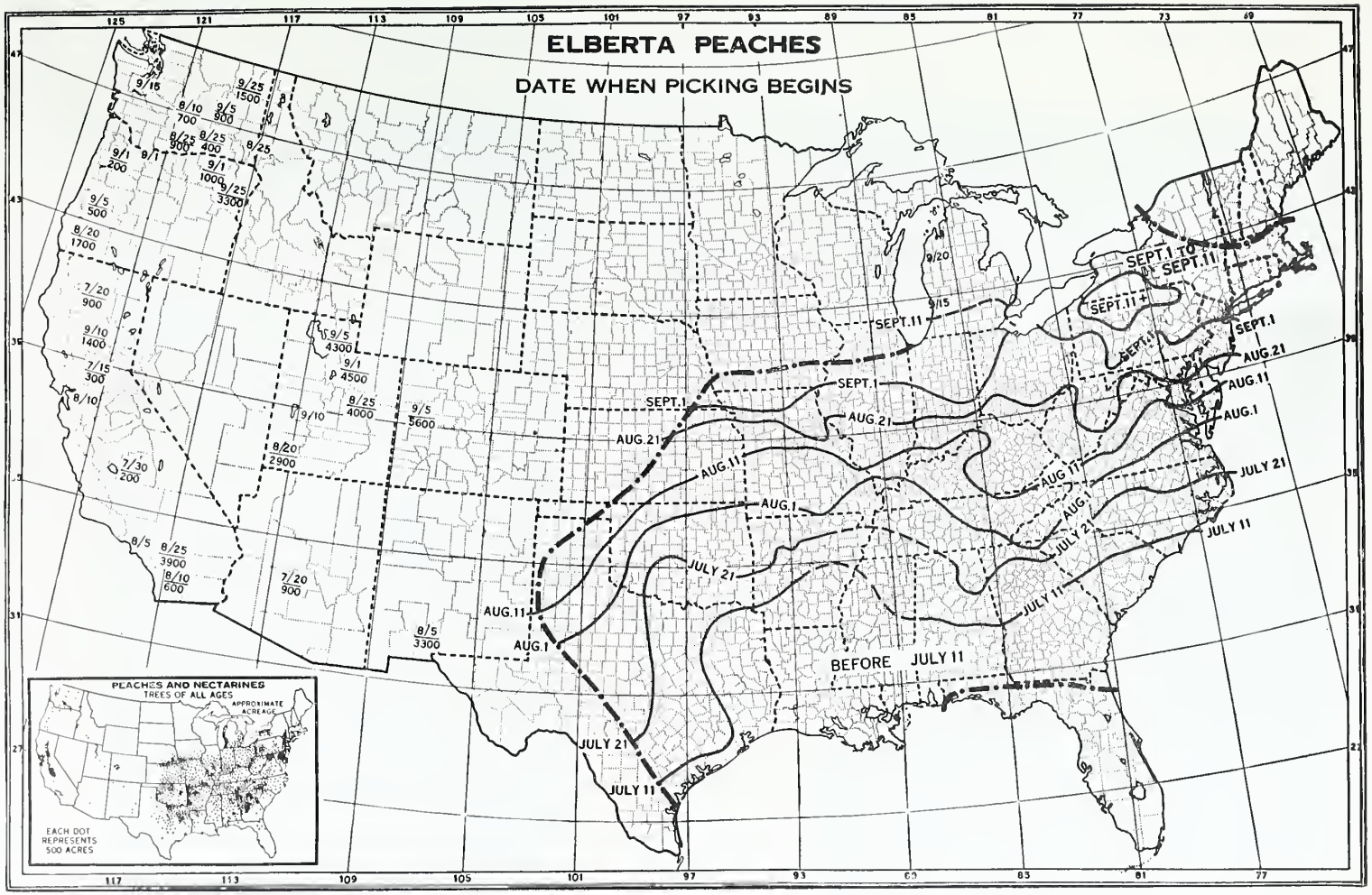


FIGURE 97.—Picking Elberta peaches begins in the important central Georgia area and in northeastern Texas usually about July 10. In Michigan and New York, picking begins about 2 months later. In the eastern fresh-peach areas, from 60 to 80 hours of man labor, 20 to 30 hours of horse work, and from 3 to 5 hours of tractor work are commonly used in caring for an acre of bearing peach orchard up to harvest time. To care for an average crop in central Georgia and West Virginia requires about 50 hours of man labor up to harvest time. In California, about 300 hours of man labor and about 12 hours each of tractor and truck work are used for growing, harvesting, and hauling an acre of Clingstone varieties yielding 10 tons per acre.

BAE 24251

FIGURE 98.—Much of the labor used for picking peaches in the commercial areas is hired. The laborer is usually paid a specified sum of money for each basket of fruit picked. Usually in areas that produce peaches for use as fresh fruit, the orchards are picked over several times during the season. When yields are average or better, from 30 to 40 bushels are usually picked a day per worker. Output per worker day is usually considerably above this figure in California when the bulk of the production is utilized by canners and dryers. After picking, the ungraded fruit is often hauled to farm or central packing plant, where the fruit is sorted, sized, and packed.

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FIGURE 99.—On most commercial apple farms the apples are picked principally with contract labor. The quantity of apples harvested per worker day depends mainly on the per acre yield, the size of the trees, and the variety. For reasonably well-cared-for orchards of late fall and winter varieties, which are usually picked over but one time, about 50 bushels of orchard-run fruit are picked per worker-day. Most orchards of summer and early fall varieties are picked over from two to four times and the quantity of fruit gathered per worker day is often materially less than for the late-maturing varieties. Workers pick less fruit when the trees are exceptionally large.

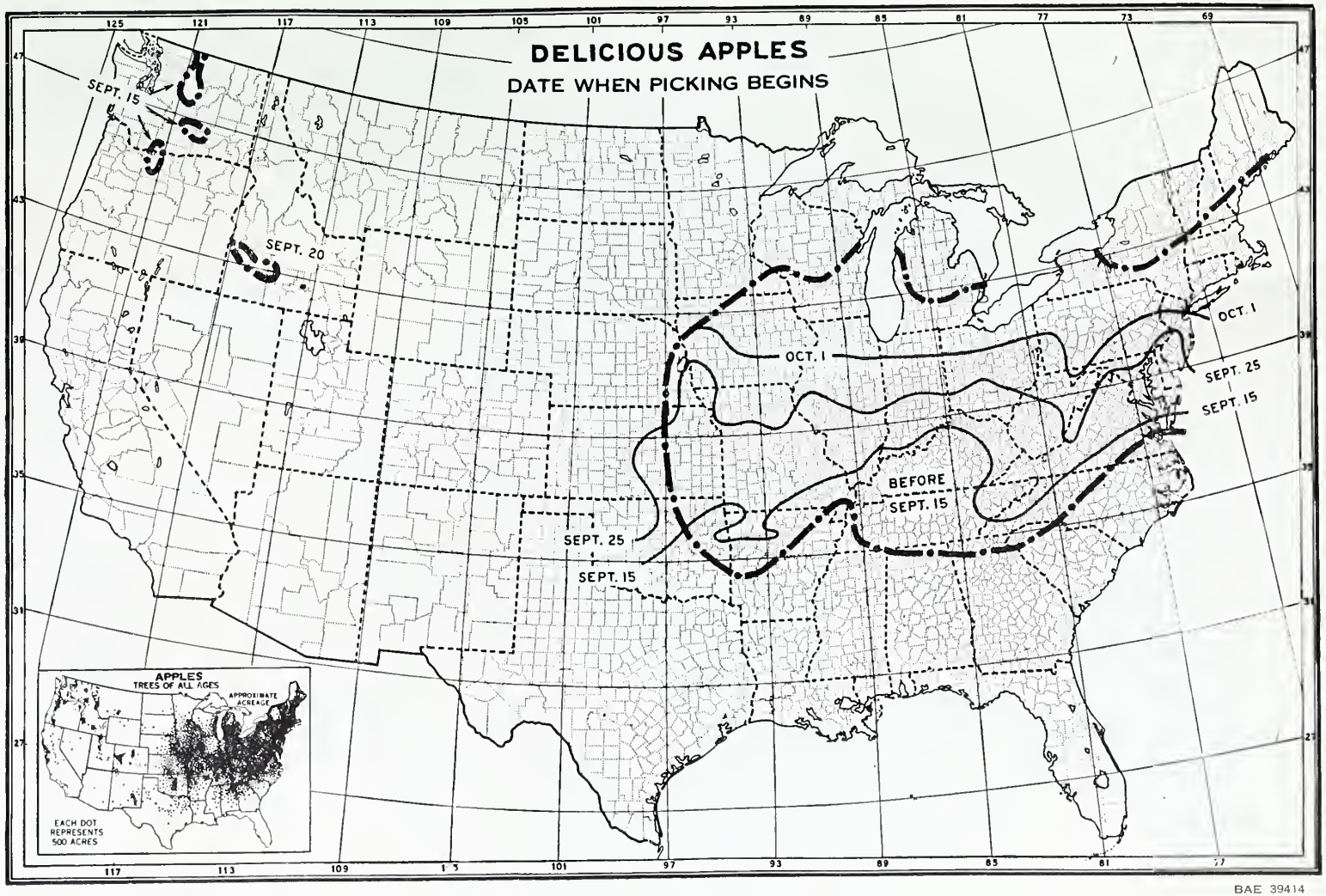

FIGURE 100.—The Delicious apple is one of the chief commercial varieties. It has a wide range. The date of picking may be considered representative of the date when extra laborers are needed in handling the winter-apple crop. Picking begins about September 10 along the southern margin of the apple belt and progresses northward; by about October 10 it is in progress in Michigan and New York. Local differences, especially in altitude, will modify the time when picking begins. A considerable number of transit laborers are needed in picking. For a 240-bushel crop in New York about 50 hours of labor are required for picking and 50 for sorting, packing, and hauling; in Hood River, Oreg., 50 hours for picking and 100 for sorting, packing, and hauling a crop of 200 packed boxes per acre.

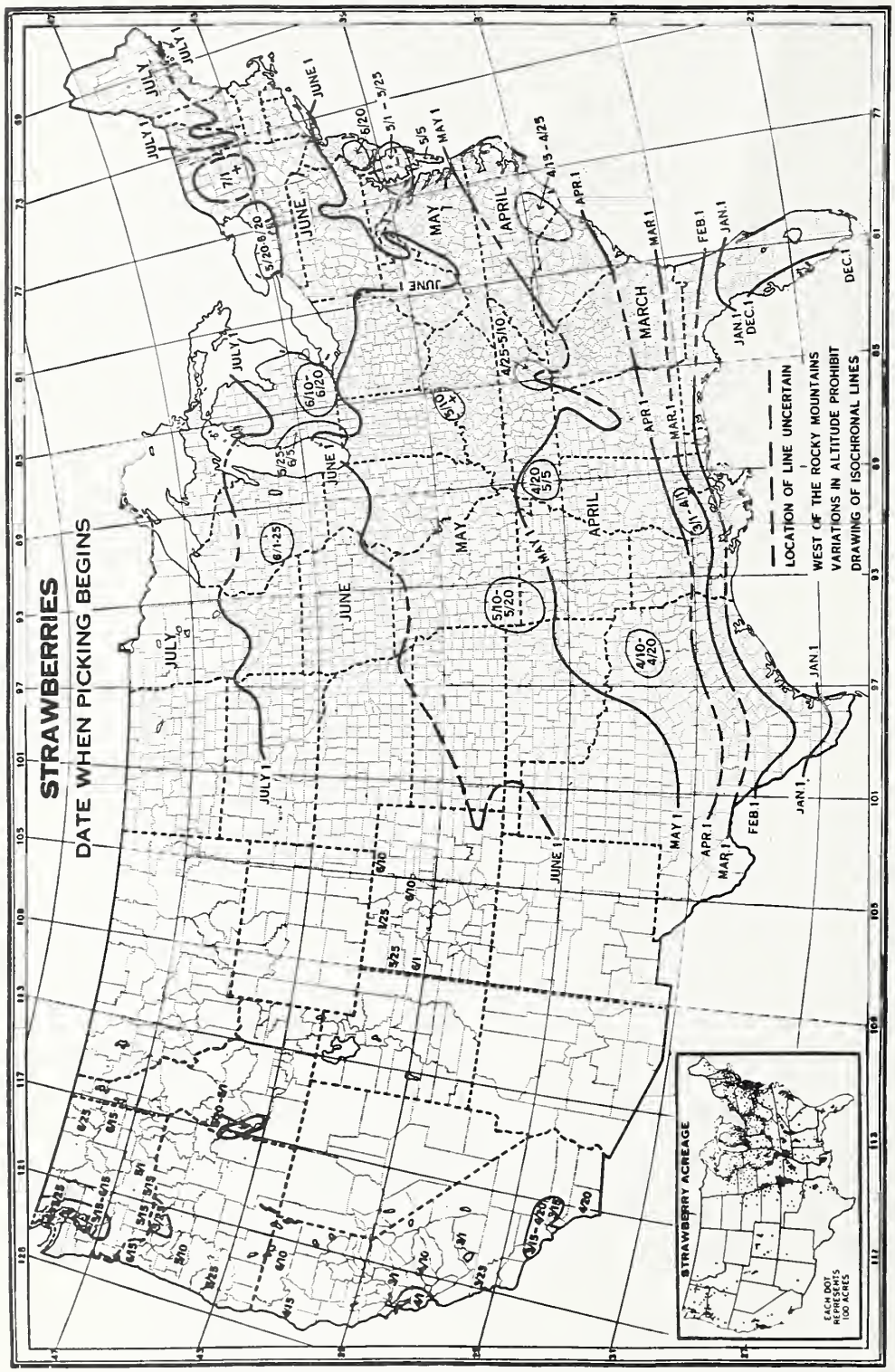

FIGURE 101.—The principal centers of commercial strawberry production are shown by circular lines; the date inside each circle shows when picking usually begins in that district. Harvest lines are drawn only for the first of each month. In the commercial strawberry areas more than 75 percent of the harvest labor is hired, usually at a contract rate. Total labor for growing, harvesting, and marketing strawberries ranges from 350 to 1,300 hours per acre, according to the area. The most labor is used in Florida and Louisiana, where the beds are renewed annually and the harvest season is relatively long. In the more northern areas, where two or three crops are harvested before the beds are renewed, usually about 70 percent of the total labor is done during the harvest season.

VEGETABLES

Consumption of most vegetables, particularly the green leafy vegetables, has increased rapidly during the last quarter century, particularly during the decade of urban prosperity, 1920–30. Total commercial production of 14 leading vegetables was 70 percent greater during the years 1929–31 than during the years 1919–21. During this period commercial production of lettuce increased about 210 percent, spinach 190 percent, carrots 540 percent, stringbeans 175 percent, celery 120 percent, cauliflower 180 percent, whereas cabbage decreased about 15 percent. Totaling all the vegetable shipments (except potatoes and sweetpotatoes) it appears that there was an increase during the decade of about 80 percent. As the increase in urban population was 27 percent, it appears that the consumption of vegetables per person in the cities increased around 35 percent. But for the leafy vegetables the increase in consumption per person, was more than 100 percent. California, Florida, and Texas profited most by this increased demand for the vegetables, for much of it was due to the availability of vegetables in the winter as well as in the summer at prices within the reach of many people.

This increasing consumption, and consequently the production of vegetables which continued, but at a diminished rate, during the 1930's involved an increasing need for labor. The commercial acreage of vegetables doubled between 1920 and 1930 but has increased only 5 to 10 percent since 1930. The area harvested is now about 3,250,000 acres, which is less than 1 percent of the acreage of all crops. But the value, of about $340,000,000 is about 4 percent of the value of all crops.

Much migratory labor, often including entire families, is employed in the production of these vegetables. A series of production centers stretch along the Atlantic Coast from Florida to New England, and successive waves of laborers follow the progress of the harvesting season northward, along the coast as far as Long Island. In the center of the continent the sequence of trucking districts is less distinct, and this is true also of the Pacific Coast. Nonetheless there is a distinct northward movement of labor through the trucking districts. In California reverse movements may occur. In this State labor camps have been established, some by the Farm Security Administration of the United States Department of Agriculture, to provide sanitary and reasonably comfortable accommodations for these migrant laborers and their families.

Much local labor, not infrequently young people from neighboring towns, is also employed in the trucking areas. In some areas a large proportion of this local labor consists of women and children.

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FIGURE 102.—In most commercial areas a total of 4 to 6 acres of bearing strawberries is considered a fairly good acreage per farm. Most of the picking is done by hired workers, who are usually paid a specified sum for each quart of berries picked. The picking season varies from about 3 weeks to about 3 months in duration, in different areas, with the shorter season prevailing in the northern areas and the longer season in the southern areas. In the northern and central areas, picking 100 quarts is a fair day's output per worker as compared with about 50 quarts in the more southern areas; per acre yields are lower and the fields are picked over more times in the southern areas than in the central and northern areas.

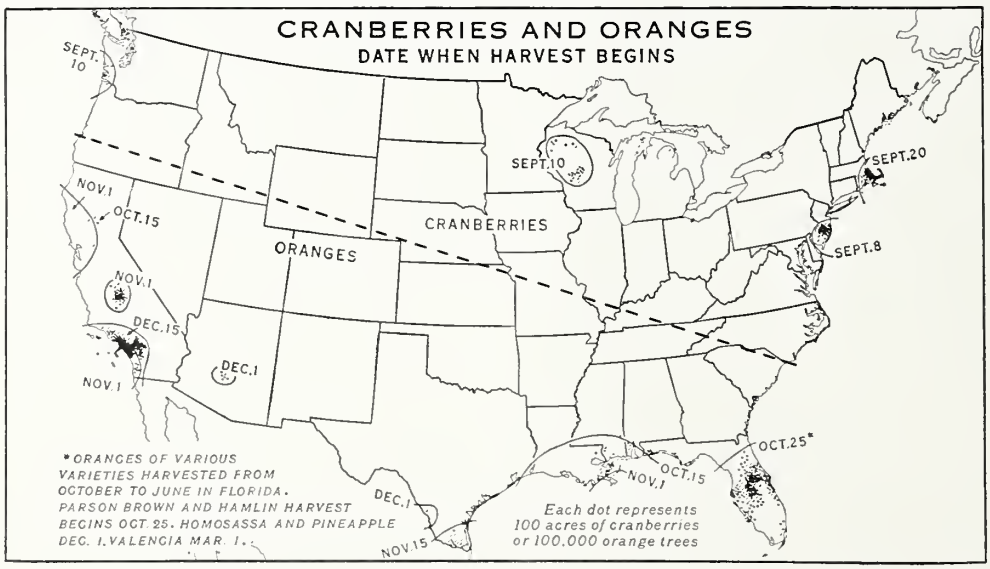

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FIGURE 103.—Dates on the map for harvesting oranges are for the Washington Navel, except in Florida where they are for the Parson Brown variety. In California, Navel and Valencia furnish all-year production; picking of Navel oranges begins in late October in the Sacramento Valley; Valencia grows largely in Southern California. Most of the Florida oranges are harvested from October to June. Massachusetts grows two-thirds of the country's cranberry crop. The labor force is large compared with that needed to maintain cranberry bogs. Picking is done by hand or by scooping. Adult men handle the large scoop while women and children pick by hand or use the small scoop called a snapper.

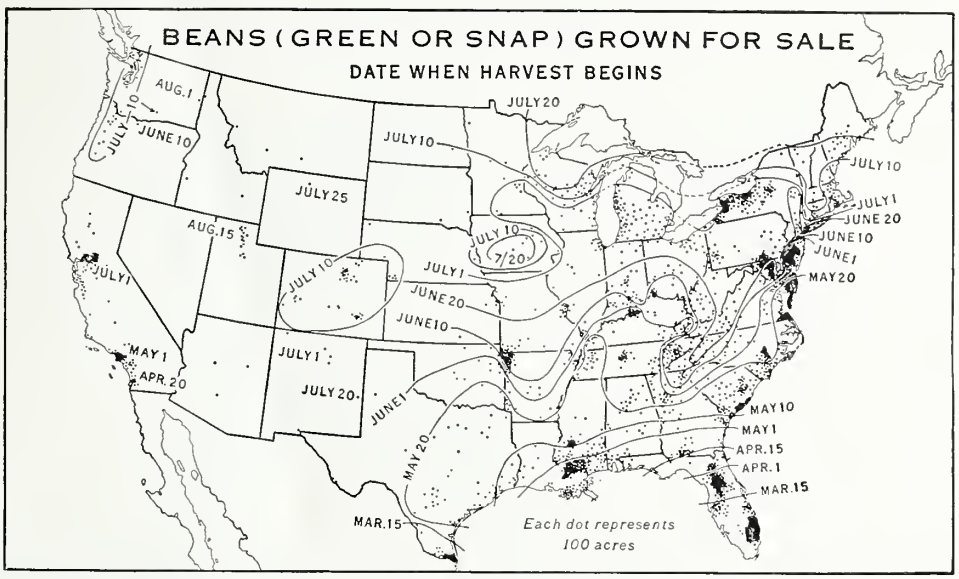

FIGURE 104.—Snap beans are grown widely throughout the United States. General harvest begins in central and southern California in late April or early May. In Florida and southern Texas harvesting begins about March 15. The harvesting of a late crop (date lines are not shown on the map) in Florida, southern Texas, and California begins in October.

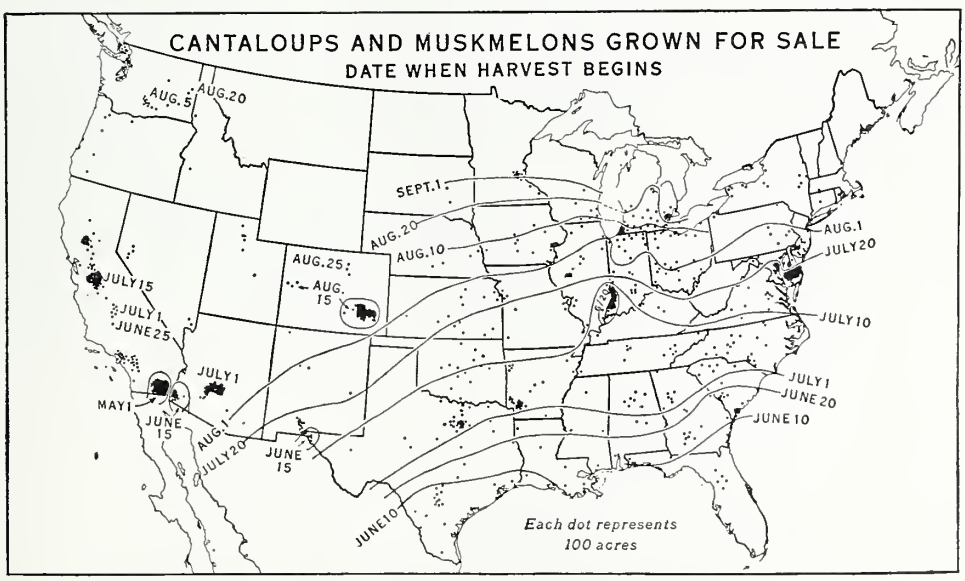

FIGURE 105.—Commercial cantaloup growing is concentrated in areas that afford very favorable growing conditions, especially in the Imperial Valley of California and Arizona; near Rocky Ford, Colo., and in certain parts of the Eastern and Southern States. California has nearly one-third of the commercial acreage; no other State has more than 9 percent. Picking begins about May 1 in the Imperial Valley, and about a month later in southeastern Texas. The harvest begins in Washington and in Michigan about August 1. Picking cantaloups requires adult strength, and judgment and skill in selecting the melons to pick.

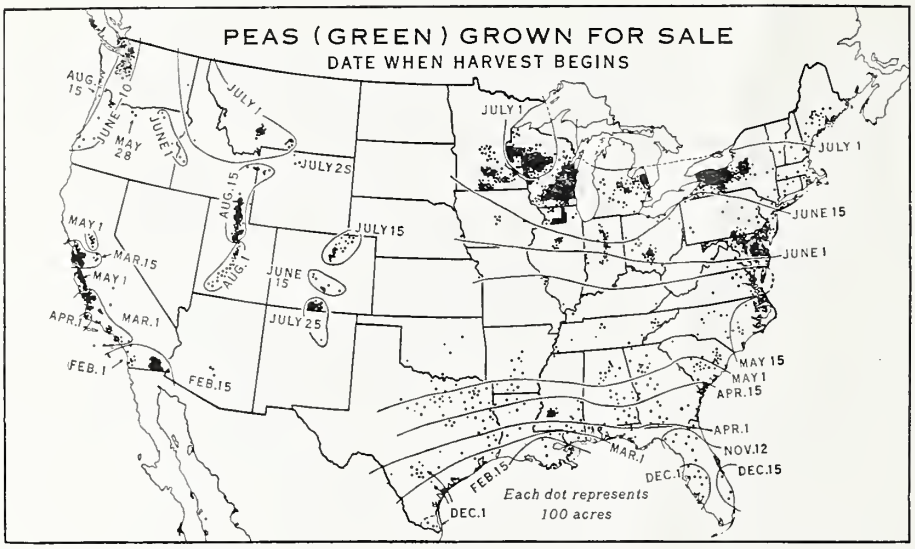

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FIGURE 106.—Green peas (also called garden, pod, English, or sugar peas) are grown in practically all States for home use, marketing, and canning. Picking of early winter peas begins in November in Florida and around the first of February in southern California. Harvesting in southern Wisconsin begins about June 20 and in Colorado as early as June 15. Some high-altitude areas in the Mountain States do not gather until August or early September. Differences in varieties and soil types may make a difference of from 1 to 2 weeks in harvest dates within short distances. Green peas for market are picked by hand. Children and women do much of this light stoop and finger work in some areas. Cannery peas, important in Wisconsin, Maryland, and New York, are harvested largely by machinery.

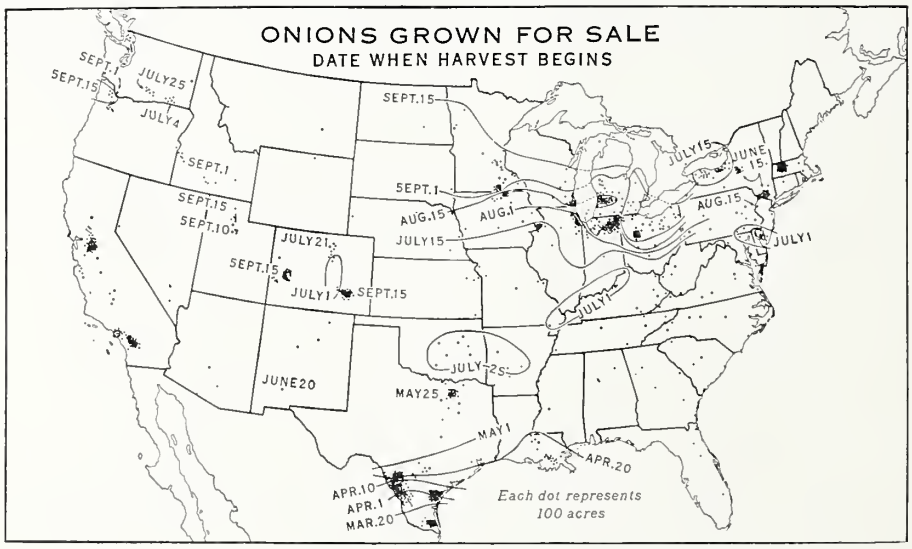

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FIGURE 107.—Four States produced three-quarters of the acreage of onions grown for commercial purposes in 1937–38. The early crop is largely of the Bermuda type grown from seed in seed beds and is transplanted. Late onions are principally yellow globe types, grown chiefly from seed and some from sets. Harvest dates depend not only upon the weather conditions during the growing season, but also upon whether the crop is grown from sets or seed. Onions are usually loosened from the ground by machine. The bulbs are pulled and clipped by hand; women and children can do this. Harvesting progresses irregularly northward after its beginning in March in southern Texas.

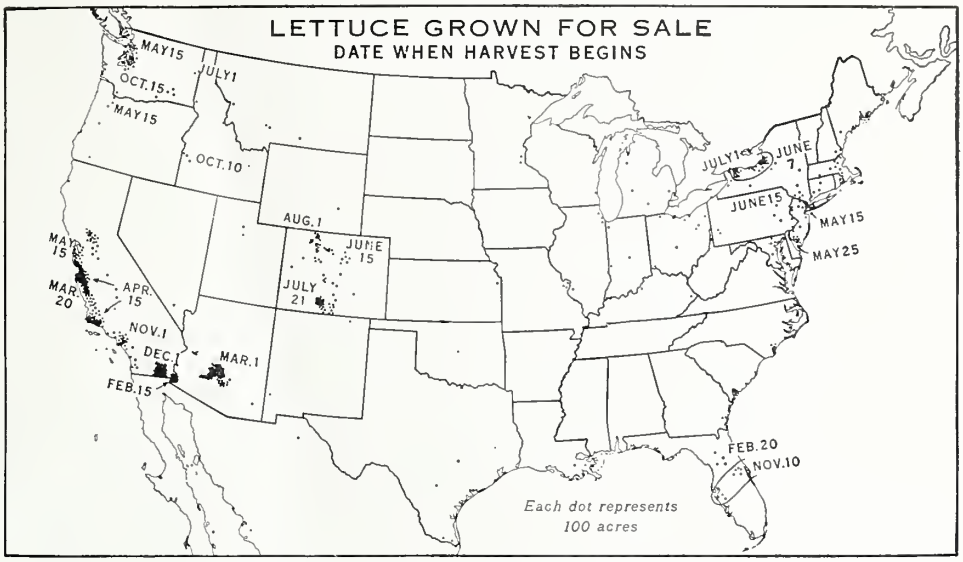

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FIGURE 108.—Two-thirds of the lettuce acreage is in California, where the crop's financial importance has given it the nickname Green Gold. The winter crop comes from parts of Florida, California, and Arizona. The early spring crop comes mainly from Arizona and California, and the late fall from California mainly. The best summer crop is grown near the Great Lakes and in high Colorado and Idaho. Much summer lettuce comes from California. In addition to the dates shown on the map, Arizona has a late crop for which cutting begins in Maricopa and Pinal counties about November 20 and in Yuma County about the middle of December. The New Jersey lettuce counties, except Sussex and Warren, have fall crops, to cut about September 25.

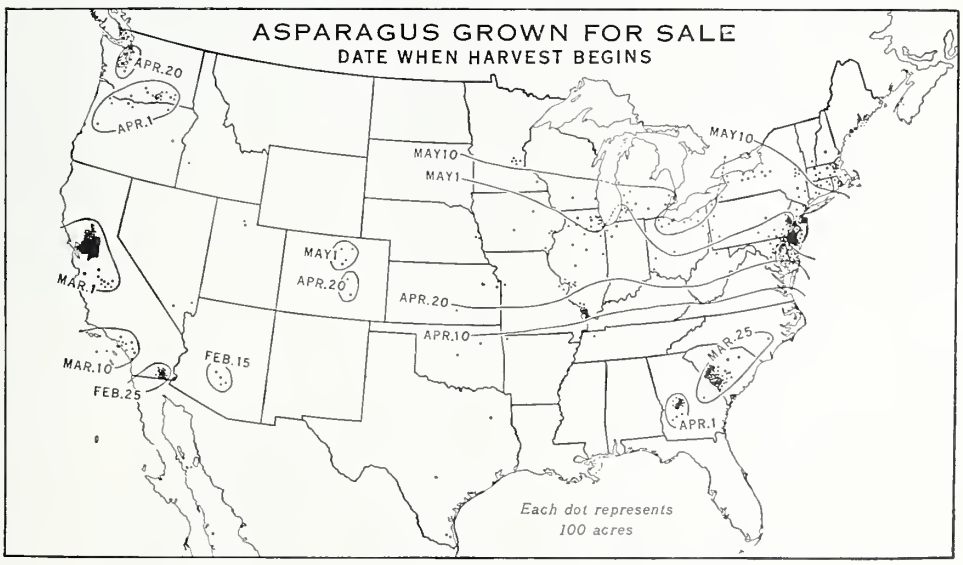

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FIGURE 109.—Asparagus, the most valuable of the early truck and canning crops in this country, is raised in nearly all States but more than half of it is raised in six California counties. In most areas it is the earliest truck crop marketed. Harvesting is confined to several weeks in the spring in most States but lasts 2 months or longer in California. Under normal growing conditions the rapidly developing young shoots must be cut daily. Cutting affords considerable employment to migratory laborers in California, and in the Middle Atlantic States.

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